THE IRON TRADE REVIEW

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THE IRON TRADE REVIEW.

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CLEVELAND, O., DECEMBER 4, 1890.

THE WEEK IN IRON CIRCLES.

General Features.

The financial situation is the one now claiming prominence, and this is being eagerly watched by both producers and consumers. A feeling of uncertainty prevails in all sections, though it is generally conceded that the worst has been passed, and that an easier money market is likely to prevail by first of the year if not somewhat before. The numerous recent failures in financial and commercial circles have fortunately had but little effect on legitimate business enterprises, but they have produced much feeling of conservatism in all lines. Collections are fairly good considering the circumstances. Taking it at large the iron trade is believed to be in a sound and healthy condition. Extreme caution prevails in all movements both on part of buyers and sellers. Many buyers seem to think that the pig iron market like the stock market has no bottom. Those better informed, however, know that before the financial troubles began iron was practically selling at cost, and that cost in this country cannot be further materially reduced. If money troubles temporarily force a lower level of values there will be a wide-spread stoppage of furnaces that will quickly prepare the way for an upward movement by heavily reducing the output. The week under review has been broken by a holiday. There has, however, been slight change from the ruling conditions reported a week ago. Little business of any kind is going in raw material, though heavy consumption still continues. For the time being buying seems to have been almost entirely given up, car load orders being the main feature, consumers large and small preferring to merely cover their immediate wants. At Cincinnati some round orders have been placed during the week and in one or two cases special terms were made for immediate delivery and spot cash. Shipments continue to go forward heavily on old orders. Our Chicago correspondent states that it is a difficult matter to tell where prices are ranging, as so few sales or any account have been made. Standard quotations, however, remain unchanged from last week, though some companies badly in need of money are here and there to be found, ready to make concessions. There has been no material change in the situation at Detroit during the past week. Buyers are not anxious to place orders except for their immediate wants. However, a larger tonnage has been disposed of than for a few weeks previous. Southern irons have been most in demand, and a few 500-ton orders have been placed, and the usual run of small orders. The closing of navigation on the upper lakes will have an effect on present sales of Lake Superior charcoal, and until the large stocks sent down are somewhat diminished, the demand is not likely to be very large. This has been anticipated, and will therefore have no effect on the prices, which on this grade of metal are being held firm. The demand for silveries has only been fair, and in some cases slight concessions have been made. Very little business is being done at St. Louis. Iron on old contracts is coming forward irregularly on account of the scarcity of cars. The expected strike of the Southern coal miners does not alarm consumers, although some furnaces are unwilling to sell ahead. Prices are nominally unchanged, but concessions are made on special lots. The Louisville market is devoid of any features of special interest. Trade still continues in light quantities and buyers show no anxiety to contract very far ahead; on the other hand it may be said that furnaces are equally as indifferent about engaging their product far into the future at present lot range of prices, which barely exceed the cost of production. There is absolutely nothing new concerning the Buffalo market, dullness being still the rule. Consumers who usually anticipate their requirements by purchases from three to six months ahead, continue the holding off policy. Generally speaking there is no pressure to sell, although a wide range of prices are quoted, uniformity being entirely absent. In the coke trade cars are more plentiful again. The shipments of last week were up to a good average, but production was materially reduced.

Iron Ore.

The season is at an end, and the last advices have, in some degree, settled the speculation as to the business of the year, which, until the past few days, seems to have been a profound secret. The result is just about that foreshadowed in these columns, or a trifle more than 7,900,000 tons of ore shipped by lake. Considering all the disappointments of the ore trade during the season now at an end, the output is not unsatisfactory in extent, but the average price was hardly up to the expectations of the trade. There are at this writing still a few vessels making ports, but the sudden cold snap will make further operations impossible, and this week will certainly see the last of the shipments. Locally, the only news of any account is the announcement by the Penokee and Gogebic Consolidated Mines, of the appointment of Messrs. Oglebay, Norton & Co. as sales agents for the Colby, Aurora, Superior, Palms and Comet mines, representing a total output of 750,000 tons. There is still occasional inquiry from Eastern parties for Bessemer ore, at a considerable advance over the original price, and for immediate shipment; but not a word is heard of any demand for next year's ore, which is in confirmation of the opinions expressed heretofore. There are those who say that it will be June before any sales will be made.

Pig Iron.

After spending two weeks in assiduous denials of the statements, in these columns, of the combined attempt on the part of the furnacemen in the Mahoning and Shenango valleys to reduce the output, the daily dispatches from the localities directly interested have borne testimony to the truth of our exclusive and absolutely correct information in the premises. At another meeting, held this week, it was resolved fully to carry out the plan heretofore discussed, and to blow out the various furnaces still in operation as fast as opportunity shall afford. The situation is this, that while the consumption of pig iron is larger to-day than it ever was, and while the demand for this material has been augmented from year to year, the furnaces have so increased their facilities as to double, and in some instances, to treble, their output. Under the circumstances, there appeared an accumulation of pig metal, notwithstanding the increase in consumption. A single furnace, for instance, has on hand 5,000 tons of iron, which is a larger quantity than the same concern carried since 1860. However, the news of the bona fide shut-down of the furnaces is liable to have a marked effect upon the present sluggish market. That the result of this action will make itself manifest by a better demand, there is little doubt; but the opinion is freely advanced that the improvement in prices and in the volume of sales will be felt immediately. Fears have been expressed hitherto that a general shutting down in this part of the country would simply mean the making of a new market for Southern irons, but the events of the past week have served to change the aspect of the case, for the strike of the Southern coal miners will put the furnaces in that part of the country out of the fight against Northern iron. The coke interests have made no move, thus far, toward conciliating the pig iron producers, and the fight that is soon to go into effect will be an interesting one for many reasons. Bessemer iron is selling in small lots at $16 cash at the furnace, and a sale of good forge iron is reported—500 tons to be delivered in December and 500 in January—at $13.85 cash, at a Valley furnace.

A TINPLATE INDUSTRY FOR AMERICA ASSURED.

Since it pleases the *Un-American Artisan*, of Chicago, to sneer at all efforts to establish a tinplate industry in the United States, it may be in order to quote what a leading English journal says on the subject. Discussing the fact that, at a recent meeting of the Llanelly Chamber of Commerce, Mr. Ernest Trubshaw, manager of the Western Tinplate Works, boldly announced that there was no longer any doubt that such an industry would be set afoot in this country, advising his fellow-manufacturers to seek for new markets at once, the *Iron and Coal Trades Review*, of London, remarks:

There can be little doubt that this is a sound and sensible view to take of the situation, for though it is possible that the McKinley Tariff may be modified in most of its features before long, as a result of the overwhelming rout of the Republican party at the polls, yet it is none the less certain that the American people are too deeply committed to the policy of creating a tin-plate industry of their own to permit the hope that foreign makers will be allowed to regain the ground that they have lost under the new Tariff law. In our opinion the duty now put upon foreign tinplates is never likely to be reduced until this particular industry has taken root in America, and that is hardly likely to be the case for many years to come. We hold that the great success achieved by the Democratic party at the recent elections is less a condemnation of moderate Protection than of ultra-Protection, and this is the rock upon which the usually astute leaders of the Republican party appear to have suffered shipwreck.

This, surely, does not carry out the *Un-American Artisan's* gleeful anticipations of an early return to the policy of paying tribute to Great Britain for every pound of tinplate used in the United States, but it is, at least, more frank, and too evidently honest to be poohpoohed out of notice.

Mr. Trubshaw suggests to the Welsh tinplate manufacturers two avenues of escape from financial disaster: first, the establishment of a tinplate industry in the colonies by the aid of subsidies, and secondly, the transplanting of Welsh establishments to the United States. As to the latter, our London contemporary is of the opinion that "the new tariff must prove a great temptation to not a few Welsh firms to transplant their works to the United States," and it emphasizes this fact by the remark that "there is no likelihood that Republican or Democrat will oppose, either now or at any future time, the determination of the American people to establish such an industry." All of which goes to show that the London journal appreciates the situation far more intelligently than the Chicago representative of British interests.

Characteristically skeptical, however, as to the establishment of a tinplate industry in this country, the *Artisan* wrote the Britton Rolling Mill Company, of Cleveland, asking whether it was true that that company was about to start a tinplate mill in this city, and it betrays its surprise by heading the reply "A Real Effort to Make American Tinplate." Here is the letter of the Britton Company:

We are in receipt of your favor of the 12th inst. inquiring about our contemplating the erection of a tinplate works in this city. In reply will say that Mr. J. W. Britton has sold his entire interest in the Britton Iron and Steel Company to John D. Rockerfeller, and has purchased a tract of land consisting of eleven acres situated on the L. S. & M. S. Railway, and running 1,000 feet north to Lake Erie. We have already under cover a building 160x130 feet, in which there is a plate mill and sheet mill which will be in operation by January 1, 1891. We intend going right ahead erecting buildings for more sheet mills the product of which will be for galvanized sheet and tinplate. How great our capacity to produce tinplate will be, we cannot state as yet. But you may state, if you so desire, that we are most assuredly going into the manufacture of tinplate, and will have some ready for market by July 1, 1891.

In addition to the above, the *Age of Steel* confirms the previous report that the St. Louis Stamping Company has placed its order for machinery for a tinplate mill, and altogether it looks as if the *Artisan* was getting beautifully "left" all around.

FOR TWO FREE TRADE CONTEMPORARIES.

Here are two comments in a similar strain from two Free Trade contemporaries, that require a little correcting:

According to *The Iron Trade Review*, a trust of the pig iron makers is being arranged for. The number of trusts now being formed would be surprising were it not for the fact that there was recently a congressional election. Somehow there are never many trusts got up just before an election. The loss of time has to be made up, hence the frequency of them at this time.—[The Cleveland Press.

***The Iron Trade Review* takes note of the fact that the English owners of an American iron plant cut down their workmen's wages just before the election for the deliberate purpose of bringing the new tariff law into disrepute, and influencing public opinion in favor of the political faction which opposed it. We think our contemporary is pursuing an unwise course in this matter. Would it like a list of the companies operated by natives and backed by American capital where similar action has been taken since the passage of the McKinley law?—[The American Artisan, Chicago.**

The *Press* is quite as wide of the mark in designating as a trust the agreement of Mahoning and Shenango Valley furnacemen to shut down on January 1st as is the *Artisan* in assuming that we charged the English owners of an American plant with cutting down wages for political effect. The facts are:

1. The valley arrangement is not a trust.
2. *The Iron Trade Review* never charged the English owners as alleged, but simply raised the inquiry whether such a thing were possible.
3. *The Iron Trade Review* is not in favor of trusts.
4. This journal does not uphold either forcing wage reductions before, or withholding them until after elections, for purely political purposes.

SECRETARY TRACY ON NICKEL STEEL ARMOR.

That portion of Secretary Tracy's annual report relating to the efforts of the Navy Department to secure armor for its new cruisers is of general interest to iron and steel men. From the Secretary's comments it appears that it became evident to the Department as early as July last that, owing to a series of annoying delays, the Bethlehem Iron Company would be unable to deliver the first 300 tons of armor required for the *Maine* and the *Texas* prior to October 1, 1891. At this rate the armor for ships now under construction, but not covered by the Bethlehem contract, amounting to about 14,000 tons, could not be delivered by this firm alone in less than six years from the present time, and the completion of the ships would be delayed accordingly. It became, therefore, imperative for the Government to obtain the co-operation of another manufacturer and secure the erection of a second armor plant. Accordingly negotiations were successfully completed with Messrs. Carnegie, Phipps & Co., the largest steel manufacturers in the United States, if not in the world, for the manufacture of 6,000 tons of armor, at the same price as is the contract for 1887 with the Bethlehem Company, to be of all-steel or nickel steel, at the option of the Department. The contract binds the firm to begin the delivery of armor in June next, and to deliver 500 tons per month thereafter. In the meantime the Government had undertaken the all-steel and nickel steel tests, at Annapolis, with results as already described in these columns. Although the Government required 20,000 tons of armor for its new fleet, not a pound of this armor had yet been manufactured, and the Department was therefore in a position to apply the results of the discovery of the superiority of nickel steel to the armor of the entire new navy, including four or five new monitors. In view of the important results revealed, Congress, at the request of the Department, made, as is well known, an appropriation of $1,000,000 for the purchase of nickel matte. Thus far only $50,000 of the above sum has been used, in the purchase of nickel for further experimental purposes, the policy of the department being to proceed continuously until entirely satisfied with the new material. This is the situation at the present time, sensational reports to the contrary notwithstanding.

THE PIG IRON OUTLOOK FOR 1891.

In 1875 the consumption of pig iron in the United States was 2,000,000 tons. The unsold stocks at the close of that year were 760,000 tons, or about 34 per cent. of production. The price of No. 1 in December 1, 1875 was $23.50 per ton.

We are now near enough to the close of 1890 to estimate the production of the year at about 9,000,000 tons, and good judges estimate that the unsold stocks, December 31, will amount to about 350,000 tons. This would be about 4 per cent. of the production, with the price approximately at $16.50 per ton.

What will be the consumption for 1891? From present indications it will between 10,000,000 and 11,000,000 tons. We base this opinion upon the fact that foundries, car works, locomotive and machine works, and in fact nearly all the makers of finished iron, are being run to their fullest capacity. The recent financial check, now happily over, may prove more far-reaching in its results upon general business than is generally supposed, but the fact of an enormous consumption nevertheless remains conspicuous and reassuring.

What of prices? We believe they will advance, and we base this belief not only on the great consumptive demand, but upon the natural and necessary reaction from the present abnormally low range of prices. We look for a good year in 1891.

GREAT FIGURES FROM THE LAKE SUPERIOR IRON MINES.

At last, after a significant silence of several weeks, we have the aggregate shipments of iron ore by water from Lake Superior iron mines up to the middle of last week. The total date of latest report was 7,863,445 tons, with the prospect, according to upper lake authorities, of reaching 8,000,000 tons by the end of the shipping sea-

son. The rail shipments show a surprising increase this year, reaching a total of about 400,000 tons; so that the grand total of production for 1890 will probably reach, say, 8,400,000 tons. Last year the total production was 7,292,254 tons.

Just what the stocks of ore mined but undisposed of will amount to at the close of the season is not certain, but they are generally believed to be less than ordinary, indicating that there has been no over-production.

As to the prestige of largest production the Norrie mine, in the Gogebic district, easily leads with a probable 1,000,000 tons, the largest annual shipment from any single mine in the world.

So much for 1890. Now for 1891.

NEARLY two weeks after *The Iron Trade Review's* announcement, some of our esteemed iron contemporaries have discovered the existence of a mutual understanding on the part of the Mahoning and Shenango Valley iron manufacturers, to close down on account of of the unprofitable nature of their business. But for the serious state of affairs which appears to render a concerted blowing out of furnaces in these districts absolutely necessary for self-protection, the fact would be rather amusing.

The Hattie Ensley and the Lady Ensley furnaces, at Sheffield, Ala., have been doing some wonderfully good work of late, for which the proprietors have great reason to be proud. The product of the former shows unusually high analyses, while the record of the latter, of 1,139⅓ tons for the week ending October 30, 1890, is highly creditable to the management.

POOR England! Russia, too, is drawing up a new Tariff which will, it is claimed, be so heavily protective as to quite rule out British competition.

IF present signs do not fail, the manufacture of tinplate will be in progress in Cleveland by next Summer.

The Hardware Trade, Minneapolis, is a new candidate for public favor. It starts out promisingly.

WHAT A SHIP CANAL WOULD DO FOR PITTSBURGH IRON MEN.

In the course of an article descriptive of the commercial interests of the Great Lakes, a correspondent of the Pittsburgh *Dispatch* makes the following argument from the Pittsburghers' standpoint in favor of the projected ship canal from Lake Erie to the Ohio River:

All these facts concerning the lakes are particularly interesting when taken in connection with the project of building a ship canal from Pittsburgh to Lake Erie. The immense traffic that passes between Pittsburgh and the Lake Erie ports makes a canal entirely feasible as a commercial enterprise. It is not a greater undertaking than some of the other great canal projects that are under way, while there already exists a great and growing commerce ready to support it and be fostered by it. Last year nearly 1,300,000 tons of coal were brought out of Pittsburgh for lake export, and hundreds of thousands of tons more are added from points that would be within easy reach of the ship canal.

The tonnage this year will be larger than last. Cleveland will send over 1,000,000 tons of coal up the lakes this season. Fairport will add 150,000 or more, Ashtabula 500,000 more and Erie several hundred thousand. All told, the lake shipments from these four ports will reach at least 1,750,000 tons this season.

The cost of transferring this coal from the cars to the lake vessels is 20 cents a ton, and freight rates are from 75 cents to $1.25 a ton. With a ship canal connecting Pittsburgh with the lakes three-fourths of this coal would be saved one handling and the cost of carriage by canal to the upper lake ports would be at least 50 cents a ton less than at present. So the saving on the coal now handled would be little, if any, short of $1,000,000 annually.

Ore could be brought back in the same vessels, with but one handling in most cases, and the total saving on it would be even greater. This year Ashtabula will receive, in round figures, 2,000,000 tons of ore, Cleveland about 1,800,000, Fairport a round 1,200,000, and Erie probably 400,000 tons. Of this vast amount, by far the greater part is used in the region immediately tributary to the proposed Lake Erie canal. At a reasonable estimate 3,000,000 tons will go to Pittsburgh and points in Western Pennsylvania and Eastern Ohio that would be easily reached from such a canal. The saving in freight and in unloading from the lake vessels to the docks and again into the cars would average scarcely less than 50 cents a ton, or a total saving on ore alone of $1,500,000 every year. Assuming that the railroads would restrict the traffic to this amount, the gross earnings would be more than 10 per cent. of the cost of constructing such a ship canal. That alone would make the investment a paying one.

But there is another consideration that will appeal powerfully to the coal interests of Pennsylvania. When the pool, or combination, of railroads carrying coal to Lake Erie ports was formed last Spring, the Hocking Valley and other roads carrying Ohio coal exclusively, demanded a differential of 25 cents a ton against Pennsylvania coal, and while there was no open agreement to that effect, it is certain some such discrimination exists against the superior product of the Pennsylvania mines. This agreement between the railroads deprives Pennsylvania coal of much of the natural advantage its high quality would otherwise give it in the lake markets and tends to greatly restrict the output of Pennsylvania mines. It is in effect a handicap of 25 cents a ton on Pennsylvania coal, and was demanded and is maintained because the Ohio coals are inferior in quality, and competition on an equal basis would put the railroads running into the Ohio coal fields and depending on Ohio coal for most of their tonnage, at a decided disadvantage. There is every reason to suppose like tactics will be continued in a determined effort to put the poorer Ohio coals on an equality with the better Peansylvania product as long as the transportation of coal is entirely in the hands of the railroads.

Once let a ship canal be opened, however, and the Pennsylvania coal will come to the front upon its proper basis. Competition between the canal and railroads would make such a discrimination as is now maintained impossible. The result would be that the superiority of Pennsylvania coal and the lower figure at which it could be sold at the "Soo," Duluth, West Superior and other upper lake ports, would greatly widen the market for it and increase the amount consumed. Primarily this would benefit the miners and mine owners of Western Pennsylvania, but the lower price at which the best coal could be laid down at all the upper lake ports would be a direct saving to all the people of the great Northwest.

Another thing to consider is that great as is the lake traffic now, it is certain to steadily increase. Everything points with the emphasis of manifest destiny to this. Although lake ship building has been carried on to an unprecedented extent in the past four years, there are still no signs of the lake marine being overbuilt or of the ship yards ceasing to turn out great steel ore and grain carriers.

The last 10 years has seen a great growth in the territory tributary to the lakes; the next 10 years will see nearly or quite as much more. The iron ore districts in the upper peninsula of Michigan and in Minnesota have by no means reached their maximum producing capacity. There are still hundreds of acres of good mineral lands undeveloped and likely to remain so for years, even if the remarkable growth of the past four years be continued for the next decade. This ore will nearly all be reduced at either Chicago or the furnaces of Western Pennsylvania and Eastern Ohio. The amount which will go to each section will depend in very large part upon the cost of carrying the ore to the Ohio and Pennsylvania furnaces and the expense of shipping the finished iron or steel to the points where it is to be used.

The ship canal would lessen both these, and enable Pittsburgh iron and steel manufacturers to lay their steel rails, or other product, down on the dock at Duluth for from $1 to $2 a ton less than can be done at the present time. This is a margin not to be despised, and would mean the continued possession of many markets that might otherwise fall to other manufacturers.

With the stimulus of such an improvement as this proposed ship canal, the iron and steel industry of the Central West would continue to go forward at even more rapid strides than in the past. The great future, which is undoubtedly before these interests, would develop more rapidly, and the benefit resulting to the whole country would be more immediate and greater. I am aware, as must anyone be who has noted the tone of the press of the lake cities, and the hostile feeling of many lake and local interests, that the ship canal project will meet with sharp opposition, but the opposition ought not to be very widespread. The ore and coal interests of all the Lake Erie ports are naturally opposed to it. So are the railroads that carry coal and ore to and from these ports, but these interests will be much more than overbalanced by the favor such a plan will win at the upper lake ports when fully understood.

It would mean cheaper coal for Detroit, Port Huron, Bay City, Saginaw, Sault Ste. Marie, Marquette, Ashland, West Superior, Duluth and many minor points, as well as for nearly the whole of the great States of Minnesota, Wisconsin and Michigan, and cheaper fuel is a most important matter in those climates. Let this be clearly understood, as well as the advantage to the whole country that will come from cheaper iron and steel, and the captious opposition of the jealous lake ports, and that part of the lake shipping interests likely to be somewhat injured, would be greatly outweighed. Besides, it must be noted that the stimulus which this improvement would give the ore and coal trade would, in the end, be a good thing for lake commerce and lake shipping, though for a short time it might somewhat derange business.

The same thing is true of the railroads, which would be most affected by this competition with such a ship canal. At first they would suffer, but the great growth of the traffic which is already in sight, and which would come more quickly under the stimulus of low rates, would, in a comparatively short time, equalize things. Already it is evident that if anything like the increase in the lake ore and coal business during the past five years be maintained for the next five, the railroads running from Pittsburgh and the Mahoning Valley to the various lake ports cannot handle the business with their present trackage. Either new roads, or more tracks for the old, will have to be built.

This, remember, is what is likely to be necessary by the time the ship canal would be open for business, if the increase of the last few years is maintained, as it seems likely to be. It is apparent, therefore, that the railroad interests would not greatly suffer, nor for a great length of time. The natural development of the ore and coal traffic, and of the iron and steel interests of Western Pennsylvania and Eastern Ohio will make a large increase in the facilities for carrying freight between the lakes and the upper Ohio Valley imperatively necessary, long before another decade has passed. That the ship canal would provide in the best possible manner, and the result would be not merely a local but a national benefit of no small moment.

THE annual production of coal in the United States now amounts to about 130,000,000 tons. This is the greatest yearly business of any country with the exception of Great Britain. About 36,000,000 tons of this output is anthracite, while Pennsylvania alone produces nearly as much bituminous coal.

AMERICAN IRON WORKS THROUGH BRITISH EYES.

We continue our extracts from the interesting observations of the members of the British Iron and Steel Institute in American iron and steel works. A gentleman connected with a large iron and engineering works at Leeds, thus records his impressions in an English contemporary:

"We happened to arrive at a time when all the works were busy, every one apparently contented, and pleased to show their contentment to their Transatlantic cousins. Bigness and speed were the leading characteristics that struck us; and if the speed seemed in some cases to degenerate into hurry, the idea was perhaps due to the somewhat reckless way in which the materials of manufacture were treated. That is to say, while all labor-saving appliances were adopted, because labor was costly, iron and fuel were plentiful, and therefore might be used lavishly. In England we are only beginning to realize how great is the waste of heat in our coke ovens, furnaces, and steam engines; but in the United States the abundance of fuel in some districts, and the high profits of manufacture in others, allow a greater disregard even than here. And in the rail mills there was a greater proportion of waste 'crop ends' than can be afforded here. Everywhere the ambition seemed to be to show a great output for a plant of given size. Blast furnaces are made to give a greater weekly tonnage than is obtainable in Europe, and Bessemer converters were worked more persistently and rapidly than with us.

"The question of 'wear and tear' does not seem to come into consideration. The running of machinery and the working of furnaces with a view to their durability as well as to their output are not of such importance in a country where interest on capital is high. The future must take care of itself, profits are so liberal that it is obviously desirable to produce as much as possible; a deduction from gross earnings to meet depreciation of plant is not necessary where the works are being regularly and rapidly enlarged out of revenue, and where 'stock dividends' or bonus shares are divided among the shareholders, in addition to a cash dividend.

"The Edgar Thomson Steel Works, at Pittsburgh, produce 1,000 tons of rails per day—more than at any other works in the world—and the South Chicago works produce only a little less. But it is questionable if the quality of rails is as high and as regular as in England, and it is certain that the specifications of quality and terms of contract put forth by the engineers of the railway companies allow more latitude to the manufacturer than is permissible here.

"Improvements in lifting apparatus are noticeable. As lately as three years ago, even in factories full of other labor-saving machines, the rudest methods were used. Now, the best kind of steam or hydraulic cranes are adopted, and in the larger works overhead traveling-cranes, propelled by electric motors, have been introduced. There is still an absence of such improved methods at the railway depots, and the complete system of hydraulic cranes and capstans, worked from one central accumulator, which are deemed indispensable in all large English goods stations and docks, are not yet to be found in the United States. But there is likely to be a change in regard to railway stations. The Central depot in New York, the Broad street station in Philadelphia, and the fine large station just completed in Chicago, have most of the conveniences of an English station, and are likely to raise a standard for imitation in other cities. And, arising out of this, there will spring up a demand for iron buildings and large-span roofs, which will afford a new source of employment to the structural engineers and manufacturers, who at present have little else to do than build bridges. In bridges also, changes are apparent. First, in regard to kind, although there is still a preference for tension members made of 'eye-bars,' known in England as 'links,' their use for small spaces is less frequent; and what in England is deemed the more substantial method of riveting is becoming adopted. Then, as to expansion in the requirements, not only do new railroads require bridges for spanning rivers, but bridges for carrying the streets and country roads over the railways are becoming indispensable in the neighborhoods of large cities, where level crossings have hitherto been almost universal.

"The lofty buildings of eight, ten, and even twelve stories which are being erected in the principal cities are of handsome appearance and massive masonry, and the interiors are constructed on what are deemed strict fireproof principles. But while, as in England, columns and girders of steel form the framework, the floors, instead of being made of concrete as with us, are composed of hollow bricks of a peculiar kind, this preference being due mainly to the costliness of Portland cement. In England, and especially in London, where cement is cheap, the preference is the other way, as the hollow bricks are not so widely adopted.

"Steel ships and marine engines are likely to extend greatly those branches of manufacture. Although large and fine steamers are used upon the lakes and rivers, there has been an almost entire absence of the ocean steamers such as are built on the Clyde and elsewhere in Great Britain. But the great extension of the United States navy, which has already commenced, is not only giving employment in the building of war ships, but is likely to be extended to merchant steamers and mail packets also, either by possible relaxation of the customs tariffs or by an alternative grant of bounties. Further, the study of English methods in ocean steamers is leading to alternation in the designs of river boats and steam tugs. The hitherto universal overhead rocking-beam engine and paddle wheels are being superseded by the more compact English screw engines, which give facilities for the economy of compound and triple expansion.

"There are endless comparisons between the wages of American and English working men, Broadly, it may be said that the money wages are at least double the English rates. There are, however, exceptions. In the manufacturing cities unskilled labor of the rudest kinds commands $1 25 per day, or, say, 5s. In Leeds, similar labor would probably obtain 3s. to 3s. 6d. Fitters and moulders obtain about $3 to $3.50 per day; or, say, 12s. 6d. to 14s., against 5s. 6d. and 6s. in Leeds. Leading men in the iron and steel works obtain still higher rates, but such exceptional wages are not unknown here also, where £1 a day is obtainable by men who, in Pittsburgh, earn only from $5 to $7. So much for the money wages. Food is more varied and abundant; and if a man is contented with coarse plenty, he can buy it more cheaply than in Leeds, and his high wages would tell in his favor. He can buy beef of a kind for 6d. a pound, but it is not meat that an English mechanic would care to eat. The prime beef costs just as much as here—that is to say, a good sirloin can only be bought for from 20 to 26 cents per pound; or, say, 10d. to 13d. Meat and flour and vegetables are cheap at the places of production, but owing to the high rents of shops, and the high wages of shopmen and assistants, and generally to the expenses of distribution, the final cost to the consumer is enhanced. Rents are more than double what we pay here; indeed, a house that could be obtained in Leeds for 4s. 6d. per week would cost 10s. to 12s. per week in Pittsburgh or New York. Clothing is dear. Ready-made clothes for the working man can, indeed, be purchased for as little as here, but only of American cloth, which is rough and flimsy. As measured by quality and durability, the cost is at least double that in England. And where, even when measured by their purchasing power, wages are higher, the service demanded in return is also greater. The work is more persistent and severe; the weekly hours are from 58 to 60, as the Saturday half-holiday is adopted only in the minority of cases. The amenities of life are fewer; reading-rooms, libraries, hospitals and dispensaries are not so abundant, and life has fewer relaxations. Wages are paid only fortnightly or monthly. The classes who benefit most are—first, the unskilled from poor countries like Sweden, Italy and Germany. The abundance of work for those who will do it, the large handful of dollars every pay-day, the greater abundance of meat and other food, and the absence of police and military supervision are advantages keenly appreciated by the immigrants from these countries. But to the steady British workman, the handful of dollars shrivels up somewhat when the spending begins, and the rough surroundings are encountered. There is another class who benefit. The superior, energetic, young mechanic finds an easier road to fortune than at home. He can get out of his class more easily, can become a foreman and a master, and accumulate capital with greater readiness than in England, where the policy of Trades Unions tends, whatever be its other advantages, to keep men at an average level. The wide extent of country, and the rapid growth of cities gives greater openings to young men than in England, and men attain to responsible positions at a much earlier age. Of course the comparison is not made by the American master quite in the way it strikes an outsider. The old legend of the 'pauper labor of Europe' is still held up as the bugbear to frighten men from Free Trade, but the fallacy is worn out as far as it might affect the emigrant from the British Isles. They are too numerous, and, in most cases, have arrived too recently to be so beguiled Indeed, in the large iron and steel works the majority of the leading hands seem to have learnt their trades in Europe, and the Yorkshire, North-country and Scotch dialects tell at once the origin of the speakers. But with all the qualifications that restrain the enthusiasm of those who visit the United States for the first time, there is much to admire, much to learn and much to imitate. The best opinions and the best criticisms come from those who know both sides of the Atlantic. The prejudices of untraveled Englishmen, and their want of appreciation of the greatest country in the world, are only equaled by the ignorance of the patriotic young American who, from his earliest youth, has been taught that Great Britain is so small, so effete, and so conservative that no good thing can come out of it. Mutual visits are the best of correctives, and it is to be hoped that such an interchange of courtesies as those of recent years may be often repeated in the future."

Construction of Steel Steamships.

Sir Nathaniel Barnaby proposes the construction of steel steamships of a much larger size than anything yet built. He speaks of a length of 1,000 ft., and a breadth of 300 ft. "I have never thought," he says, "that size is a disadvantage in merchant ships, supposing they can be worked financially. On the contrary, the advantage arising from size in passenger ships seems to me to be so great that I do not see where we shall stop. In considering the problem, two sets of apparent difficulties confronted me—namely, those connected with the building of the ship afloat, and those relating to receiving and discharging cargo. The ship would be a steel island, incapapable of entering any docks. The building difficulties soon disappeared. They had no real existence. To meet the other difficulties, I propose to form shallow still-water harbors or docks within the ship, entered by gates in the sides, and to carry, always afloat there, the loaded barges and tugs; turning the barges out and taking in fresh ones already loaded at the ports of discharge and shipment."—[Glasgow Engineer.

THE J. G. Cupples Co., of Boston, will soon issue a very dainty holiday book entitled "Aunty's Elfin Land." It is a collection of fairy stories; or rather, the combined histories of three children who had most strange adventures in the land of "the little folk." They are written by Mrs. Maria Hildreth Parker, and are illustrated by Hermann D. Murphy. The book will commend itself to those who are in search of holiday gifts for children who have outgrown the jingle of nursery rhymes. Mrs. Parker is the widow of Col. J. M. G. Parker, for many years a prominent citizen of New Orleans, and is the sister-in-law of Gen. B. F. Butler.

SUBMARINE cables of the world now extend over 120,070 nautical miles Government administrations own 12,524 miles, while 107,546 miles are the property of private companies. The total cost of these cables has been about £40,000,000. The largest owner of submarine cables is the Eastern Telegraph Co., Limited, whose system covers the ground from England to India, and comprise 21,860 miles of cable. The Eastern Extension, Australasia, and China Telegraph Co., Limited, which works the far East, has 12,958 miles more.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

VERMILION RANGE.

Ore shipments of the Duluth & Iron Range road for the year have been a total of 880,732 gross tons, of which 542,718 tons have come from the Minnesota Iron Co., over one-third, 526,002 tons from the Chandler, and 12,012 tons from the Pioneer. The record of the Vermilion iron range since its opening has been as follows:

	Gross tons.
1884 (beginning in August)	62,124
1885	225,484
1886	304,395
1887	390,467
1888	512,000
1889	837 003
1890	880,732
Total, seven years	3,212,103

—[Duluth Herald.

It needs but a careless glance over this property to show the observer that the Pioneer mine will take its rank among the very prosperous mines in the near future, as rapid strides are now being made in that direction, says the *Iron Home*. The new shaft which has lately been located is now down about 20 feet, but on account of its size the hard rock which it is being sunk through, it being a three-compartment shaft, work is necessarily slow. This shaft is located on the foot-wall but a few feet from No. 2 shaft of the Chandler across the line, and it is the intention, if necessary, to sink it 400 feet before the drift will be commenced. Permanent timbering is being done here, so that when the proper depth has been reached the shaft will be completed for work, it will take, in all probability, a year to reach the proposed depth. The drums and machinery formerly used by this company in their early work on the property, will be used temporarily on this shaft until the vein is found and opened; then a first-class mining plant will be substituted and placed at the lake, and will be used in the complete workings of the mine. Sinking is the only work going on at No. 2 shaft just now. They are down about 240 feet, and 50 feet will be added to this before Spring. It is the intention, after the proposed depth has been reached, to widen this shaft at the surface so that it will also be of three compartments, which at present it is from 50 feet below the surface. No. 1 is down 170 feet, but work will be commenced next week to lower this 50 feet more. At present they are taking a very high grade of ore from this shaft. The work that is being undergone at this, as well as at other properties in this neighborhood, assures us of a coming season that will mark the beginning of a prosperous era for Ely, and one that it well deserves.

GOGEBIC RANGE.

A press dispatch to the *Evening Wisconsin* says that the Jackson County Iron Co. reports a good find of ore at their mine, seven miles east of Black River Falls. An analysis of the ore shows it to be of superior quality, and the company hopes at no distant period to supply the York Iron Co.'s furnace, located in that city, which uses in the neighborhood of 100 tons of ore per day, now supplied from the iron mines on the Gogebic range. A Peshtigo dispatch, Monday, says that some excitement has arisen upon the discovery of specimens of iron on the Peshtigo River, about 15 miles from that place. The specimens are declared by experts to show a large percentage of valuable ore. Explorations will be carried on to ascertain what may develop. The location is upon a rocky, hilly range, just where iron might be expected to be found, and it would be nothing strange if a deposit of this material might be found here as well as upon the iron ranges north. The explorations will be watched with much interest. The land upon which the specimens were found belongs to the Peshtigo Co. An Ashland correspondent contributes the following: Large deposits of iron ore, which assays 60 per cent. in iron, were uncovered in the Della option, near Upson, this week. All the new mines, five or six in number, on the west range in Wisconsin, an extension of the Gogebic in Michigan, have encouraging prospects, and three will ship next season.—[News Record, Nov. 29.

MARQUETTE RANGE.

A special meeting of the stockholders of the Lake Superior Iron Co. will be held at the company's Boston office on December 3d, for the purpose of authorizing an increase in the capital stock of that corporation, to provide for the purchase of vessels for use in transporting the product of its mines to market. The directors recommend that 12,000 new shares be issued at par of $25 each, as this will provide the amount needed to bring the company's lake fleet up to carrying capacity that the management deems essential for the most economical handling of its product. The Lake Superior was slow to engage in the experiment of handling its own ore, but is well satisfied with the showing made by the two vessels that it has already in commission, as appears from its decision to secure two more of equal capacity.—[Mining Journal.

MENOMINEE RANGE.

The Tobin find, near the Shafer, improves with each day's work. Capt. Tobin will go right on developing, and if the property is not sold, will organize a company and work it himself.—[Diamond Drill.

The Werner Mining Co. will thoroughly explore their property, with the aid of a Sullivan diamond drill. The parties interested are sanguine of striking it rich in that neighborhood, and are greatly encouraged by recent developments.—[Negaunee Iron Herald.

These are busy times at the Pewabic mine. Just now they are preparing the ground for the erection of a new hoisting engine house, north of the machine shop. The new hoisting plant will comprise two 10-foot drums direct hoist from the engine crank, and will carry 1,500 feet of wire rope. The plant will be like that in use at the Tamarack copper mine, which is different from any in use on this range. It will be somewhat similar to those used at B and C shaft, Chapin mine, except that the Pewabic drums will be straight faced, instead of cones. A duplicate air compressor will be placed alongside the one now in use at once, and will probably be running by January 1, next.—[Menominee Range.

The Millie has shipped up to this date 33,000 tons, and but for the difficulty in obtaining cars as fast as needed, would have made an even better record. The Millie is looking better to-day than ever before, and if it falls into the hands of the Chapin Mining Co. on the first of next January, they will find that they have secured a valuable piece of property.—[Menominee Range.

LATEST PHASES OF THE FUEL QUESTION IN PITTSBURGH.

SPECIAL CORRESPONDENCE.]

To say that the question of fuel and the probable continuation of the supply of natural gas is an absorbing one in this section would lack a good deal of giving an idea of the feeling of the manufacturers here. Not only are the owners of the larger factories and mills worrying over this question, but the small manufacturing concerns are also on the anxious seat and with a good prospect of remaining there for some time. And not the least annoying feature of the question is the utter impossibility of finding out the true situation of affairs. I called to-day on one of the leading officials of the Philadelphia company to secure, if possible, the truth in regard to some rumors on the street, but had my trouble for my pains, the response being "I decline to give any information." So afraid was this official that he would say something that he would not even admit as true, things that were already known to their customers by an official notice from their office.

This much is known. There has been a large part of the puddling furnaces shut off, and the announcement was then made that would enable the company to give the balance of their consumers an abundance of gas; that the supply since these furnaces were shut off has been but little, if any, better than before; that when the cold weather of last week came on there was a greater shortage than before; that last notices were sent out to a large number of manufactories, both large and small, notifying them that the gas would be shut off; that a larger proportion than ever of their domestic consumers have suffered from a shortage of gas this week; that a number of the large office buildings of the city have been obliged to abandon the use of gas and use coal; that those who still depend on the gas are nearly all troubled more or less with a shortage of gas. This seems to be about the situation of the gas question as it appears on the surface, but as to whether this gives an idea of the actual facts is questioned by many who are in a position to know what they are talking of.

There are those who claim that while the supply is not as great as it once was; that the shortage is not so great as is made to appear; that the tapping by the Philadelphia Co. of the Belle Vernon field with their new line just finished, gives them an abundant supply, and that the whole thing is manipulated for stock jobbing purposes or to freeze out small stock owners. But what the facts are it is impossible to tell. The officials refuse to talk and I am told that every well that this company has is under lock and key, and that every employe connected with the wells are under oath not to tell the condition of the wells. So far as I have been able to learn those who are depending on other companies than the Philadelphia Co., are having very little trouble, while all the companies are extending their lines out to new fields, and new and prolific fields are being found nearly every week.

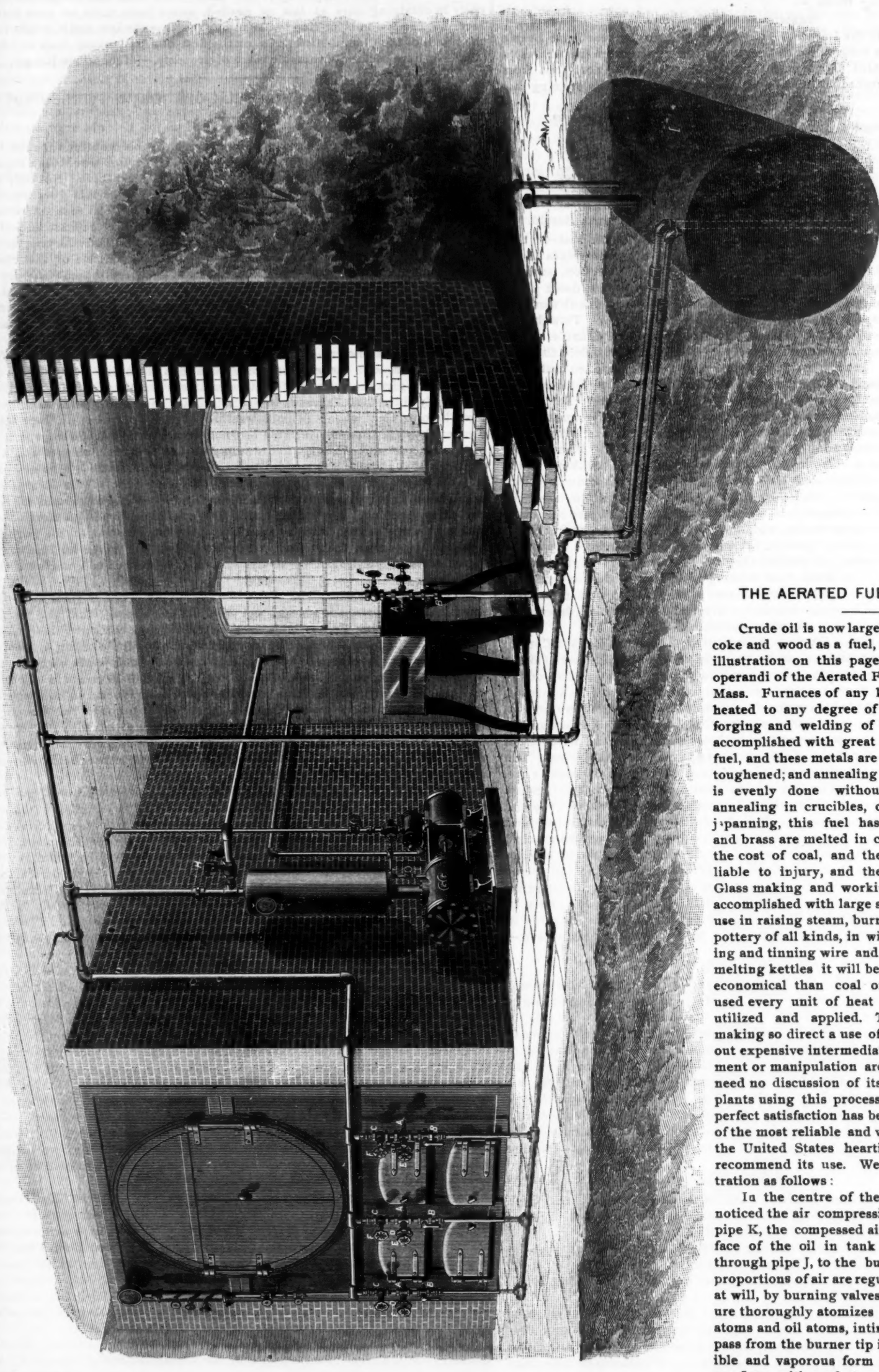
The natural result of this uncertainty in the supply of natural gas is an active inquiry into the various kinds of fuel gas, with the adoption of the best process as fast as the manufacturers become satisfied as to its practicability. Mr. Archer, patentee of what is known as the Archer process, has been here some time, and through the courtesy of his representative I learn that this process is already introduced, in this section, into the mills of the Cambria Iron Co., the Linden Steel Co., the Duquesne Tube Works and the Pittsburgh Tube Works, Limited, and that they have now on their books orders for fuel gas plants from 20 more of the largest concerns in this section. The only trouble that they are having is the inability to fill orders as fast as they are wanted.

The Aerated Fuel Process is being introduced here by the Hall Steam Pump Co., who have already placed the apparatus in the Nail City Lantern Co., Wheeling, W. Va., Rodefer Bros., Bellaire, O., and have just completed the fitting up of a furnace for J. Painter & Sons Co. with one of their appliances. The success of these plants, which are, as yet, but little beyond the experimental age, so far as this section is concerned, is being watched with very great interest by other manufacturers, but there seems to be but little doubt in the minds of those who are watching the course of events here that some form of fuel gas will be generally adopted, as fast as the necessary changes in mills and furnaces can be made. So far as I have been able to learn, those using the processes mentioned above are well pleased with the results. There are several other experiments being made in the same direction by other parties here, but so far are only experiments, the success of which will be noted later, if any do succeed.

A new water meter is being put on the market by the Fuel Gas & Manufacturing Co., of this place, which is calculated for use where domestic consumption of water is measured. The simplicity of construction and accuracy are its principal claims for favor. This company have just moved into the works recently occupied by the Westinghouse Air Brake Co., which enables them to double their working force and capacity. They will add a brass and iron foundry for their own work, and for general work. Their line of manufactures will include water meters, mentioned above, water heaters, gas saving appliances for heating and cooking stoves, and gas regulators.

Thos. Carlins' Sons have just completed one of the finest lime grinding plants in the country. It was erected for the Wheeling Lime & Cement Works, of Wheeling. The capacity of the machine is over two thousand bushels per day, and its principal feature is that it is practically dustless, a consideration of great importance when the injurious nature of lime dust is considered.

PITTSBURGH, Dec. 1, 1890. A. L. D.



THE AERATED FUEL PROCESS.

Crude oil is now largely supplanting coal, coke and wood as a fuel, and the handsome illustration on this page shows the modus operandi of the Aerated Fuel Co., Springfield, Mass. Furnaces of any kind or size can be heated to any degree of heat desired. The forging and welding of iron and steel are accomplished with great saving of labor and fuel, and these metals are greatly refined and toughened; and annealing of copper and brass is evenly done without tarnishing. For annealing in crucibles, case hardening and japanning, this fuel has no equal. Copper and brass are melted in crucibles at one-half the cost of coal, and the crucibles are less liable to injury, and therefore last longer. Glass making and working are successfully accomplished with large savings in fuel. For use in raising steam, burning brick, tiles and pottery of all kinds, in wire mills for annealing and tinning wire and under tinning and melting kettles it will be found much more economical than coal or coke. Wherever used every unit of heat the oil contains is utilized and applied. The advantages of making so direct a use of the crude oil without expensive intermediate process of treatment or manipulation are so obvious as to need no discussion of its merits. Wherever plants using this process have been put in, perfect satisfaction has been given and some of the most reliable and wealthy concerns in the United States heartily endorse it and recommend its use. We describe the illustration as follows:

In the centre of the engraving will be noticed the air compression, G. G. Through pipe K, the compessed air presses on the surface of the oil in tank D, forcing the oil through pipe J, to the burners A, A, A. The proportions of air are regulated to any degree, at will, by burning valves D, E, the air pressure thoroughly atomizes the oil, and the air atoms and oil atoms, intimately commingled, pass from the burner tip in a highly combustible and vaporous form which burns like a gas flame with perfect combustion.

POSSIBILITIES IN ENGINE ECONOMY.

Speaking of economy in railway management, the *Railway Master Mechanic* says that very careful and long-conducted investigation into railroad accounts have shown to the officials of at least one railway system, that the most important single item wherein saving may be effected is to be found in the coal bill. If the same investigation could be made into the accounts of the average stationary steam power plant, the same conclusion would doubtless be reached, and for the same reason, because the item of fuel is the largest item in the expense account of the power plant. Economy in manufacturing processes in all lines of manufacture is carefully studied and the utilization of waste products, the odds and ends of raw material, is looked after sharply, but it is not every manufacturer or owner of a power plant that looks after the economy of the engine and boiler rooms. In fact, except in scattering individual instances it may be questioned if the possibility of economy in this direction is much thought of after the first selection of the plant. If there is any thought of economizing in this direction it generally takes the shape of cutting down wages paid to engineers and firemen, on the principle that the amount of coal and supplies is a fixed thing, no matter who is in charge. It is, however, gratifying to note that in some quarters there is a growing appreciation of the economy of employing competent men at good wages. It will generally be found in such cases that the higher wages paid carry with them a holding of the engineer responsible in large measure for the economical working of the plant. Engineers are therefore interested in studying the possibilities of economy in the plants under their charge, and if they take hold of the subject in earnest they will find the study an interesting one.

In considering this subject, if the engineer will make it a home question he will find it to branch into two directions. The first question that naturally arises is whether the plant as it is at present, can, by more careful management, be run with less fuel, less supplies, less stoppages, and fewer breakdowns and repairs. The engineer must be more than ordinarily careful, if he does not find where, by closer watching and more careful study of his plant, he can improve its operation. It may be in the firing, it may be in the adjustment of the engine valves, it may be in the lubricators, or in any one of the minor details of the plant. When, and only when, he is sure that he has done all that he can do with the plant as it is, should he consider the second branch of the question, and ask what can be added, what changes should be made, and what should be thrown out and replaced by new. There are doubtless thousands of plants in which worn and leaky boilers and wasteful engines could be replaced at a steady profit to the owner, but until the engineer has made a study of the plant, and can back up his requests by strong arguments, he cannot hope to have much attention.

In considering what is possible in the way of economy in any plant the engine must have some standard of comparison. If he is running an ordinary tubular boiler he should know that such boilers when properly set and fired have evaporated eight, nine or possibly more pounds of water per pound of coal. If he finds that he is only evaporating five or six, he has before him the problem of how to make the boiler do eight or more. The boiler may be full of scale, the setting may not be right for the fuel, the chimney or stack may be too small, but so long as he is not doing as well as he knows can be done he has a fruitful subject for study and experiment. So if he is running an engine which takes 35 pound of water per inch horse-power per hour, and, other engines of same kind have done the same work with 30 pounds, he should know why and better the record if in his power. It is not necessary for him to waste time in speculating on what point of perfection the steam plant of the future may reach. His individual plant is the one that requires his attention, and its possibilities in economy his careful study. There are two extremes to be considered: first, the certain amount of power that must be delivered; second, the coal pile. All between is intermediate, and every attention to detail that will reduce waste and increase efficiency will, with the same power delivered, lessen the drain on the coal pile. Leaky boilers, unprotected or leaky steam pipes, too tightly packed stuffing boxes, bearings poorly oiled or too snugly fitted, poor firing, dirty boilers, all these cost fuel and fuel costs money. The possibilities of economy in these directions are a most proper subject of study on the part of the engineer who has an ambition to rank high in his calling.

Machinery Engineering as it Was and is Now.

Probably but few have any correct idea of the difficulties which were met with 60 or 70 years ago in making suitable tools and machinery from metal. There were no planing, boring, or shaping machines; the turning-lathe and the drill-borer were about all the devices which could be called into use by the mechanic of that time. Sewing machines, which play such a part in the manufacture of shoes, could not possibly be made at that time. All inventors had to make by hand the machines they invented, without the aid of other machines in the making of the individual parts. They had to invent some tools so as to be able to make certain parts of their invented machine. When the celebrated English machinist Clement entered a shop as master at London in 1814, he found the tools so poor and defective that he had to spend days in making such tools as were needed.

James Watt, the inventor of the steam engine, could not get his first machines in working order in consequence of lack of some contrivances. The first cylinder which he had cast was not tight and was on one end five millimeters wider than on the other. A good cylinder should not show more difference in width than ½ millimeter.

And then the cost of work at that time was extravagant. Whitworth, one of the oldest manufacturers of working machines in England, says that the polishing of cast iron costed $3 per square foot 40 years ago, as the work had to be done by hand. To-day a metal planing machine does better work for 2½ cents a square foot. The first steel pens had to be made by hand. The manufacturer Perry paid for the first steel pens $1.25 a-piece. And we often read that steel pens used to cost $5. But still these pens were not as good in quality as those which are made to-day. After factories had been established, the price of a steel pen was still $1, then 50 cents and finally 25 cents, which price was kept up for some time. To-day one can get a gross for that price.

COST OF STEEL MAKING IN SPAIN.

The manufacture of steel in Spain has given considerable concern to the Spanish Government in connection with the production of equipment for the army and navy. Don Francisco Gascue has lately published a *memoir* on the subject which contains some interesting data. The two districts considered are Asturias and Biscaya, the former the seat of the coal industry, and the latter possessing the Bilbao ore deposits. The cost of making Bessemer pig at Bilbao is placed as follows:

COST OF BESSEMER PIG AT BILBAO.

	Francs.
1,920 kg. ore @ 7 francs	13.44
422 kg. limestone @ 2.75 francs	1.58
970 kg. coke @ 26 francs	25.22
Labor	4.50
Repairs and general expenses	3 50
Total	48.24
Cost per gross ton	$8 65

The manufacture of Bessemer pig at Gijon, Mieres and Felguera, and Quiros, in Asturias, is placed respectively at 58.34, 57 74, 67.13 francs per metric ton. Basic pig at Mieres and Felguera would cost 52.74 francs, making the cost of basic Bessemer 87 52 francs, and of basic open-hearth 96 61 francs.

At Bilbao the cost of making acid Bessemer at the works of the Societe Altos Hornos, with two 8-ton vessels, single turn, is as follows:

COST OF ACID BESSEMER STEEL AT BILBAO.

	Francs.
1,107 kg. pig @ 48.20 francs	53.47
56 kg. spiegel @ 1.70 francs	9.52
180 kg. coal @ 20.50 francs	2.70
50 kg. coke @ 26 francs	1.30
Labor	2.95
Refractories	1.50
Molds	1.50
Repairs and miscellaneous	2.00
General expenses	2.00
Total	77.74
Deduct 70 kg. scrap @ 48 francs	3.36
Cost per metric ton	74.38
Cost per gross ton	$14.50

The cost of acid open-hearth is placed as follows:

COST OF ACID OPEN-HEARTH STEEL AT BILBAO.

	Francs.
537 kg. pig @ 48.25 francs	35.90
536 kg. iron scrap @ 72 francs	38.50
25 kg. steel scrap @ 60 francs	1.50
12 kg. ferro-manganese @ 330 francs	3.96
95 kg. ore @ 10 francs	0.95
Labor	6.00
Molds	1.50
Refractories	1.60
Repairs and miscellaneous	3.00
General expenses	2.00
Total	96.22
Deduct 25 kg. at 60 francs	1.50
Cost per metric ton	94.72
Cost per gross ton	$18.57

The cost of basic open-hearth is figured at 95 at Bilbao. These costs are certainly very low, and explain how at times Spanish Bessemer pig has secured a market in this country.

The Height of Factory Chimneys.

The following experiments upon large chimneys were made recently in Germany: An old chimney 67 feet high, with internal diameter of 19.6 inches to 13.8 inches, and with a total passage, from fire to chimney top, of 98 feet, was taken down, and a new chimney, with an intended total draught of 95 feet, and a minimum internal diameter 25.5 inches was planned out. When the chimney had gone up 39 feet, it was tried. Already there was a great improvement on the old chimney; again, at 46 feet still better, and at 52 feet 6 inches the draught was excellent, the smoke issued clear, without soot, and there was an economy of from 15 to 20 per cent. in fuel. So the chimney was finished off at that height. Herr Ruth thinks chimneys are usually made too narrow, and the mischief is aggravated by increasing their height, so fuel escapes unburned. Herr Ramdhor, of Goth, confirms this, and recommends a uniform internal diameter as being more rational, and as protecting the brickwork from the hot and rapid axial stream. The cross-section of the chimney should be one-fourth to one-eighth the grate area, and the height, not less than 50 feet, and should not exceed 100 feet to 120 feet.

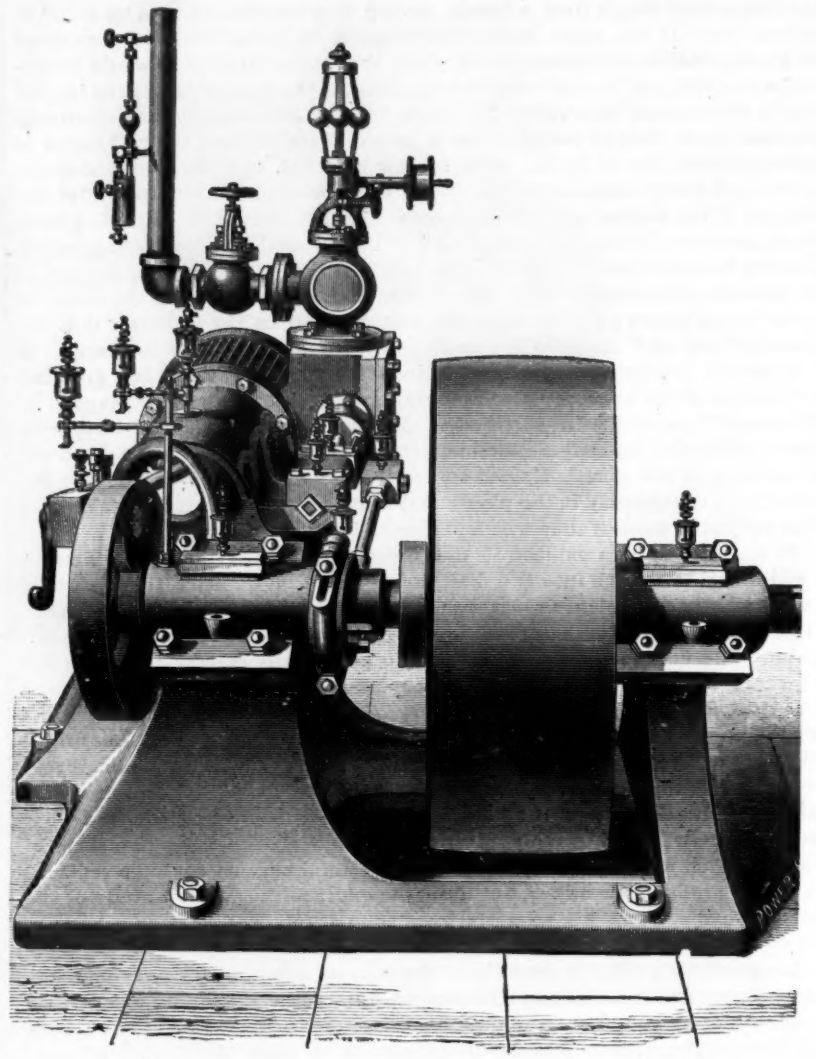
Forged Steel Car Wheels.

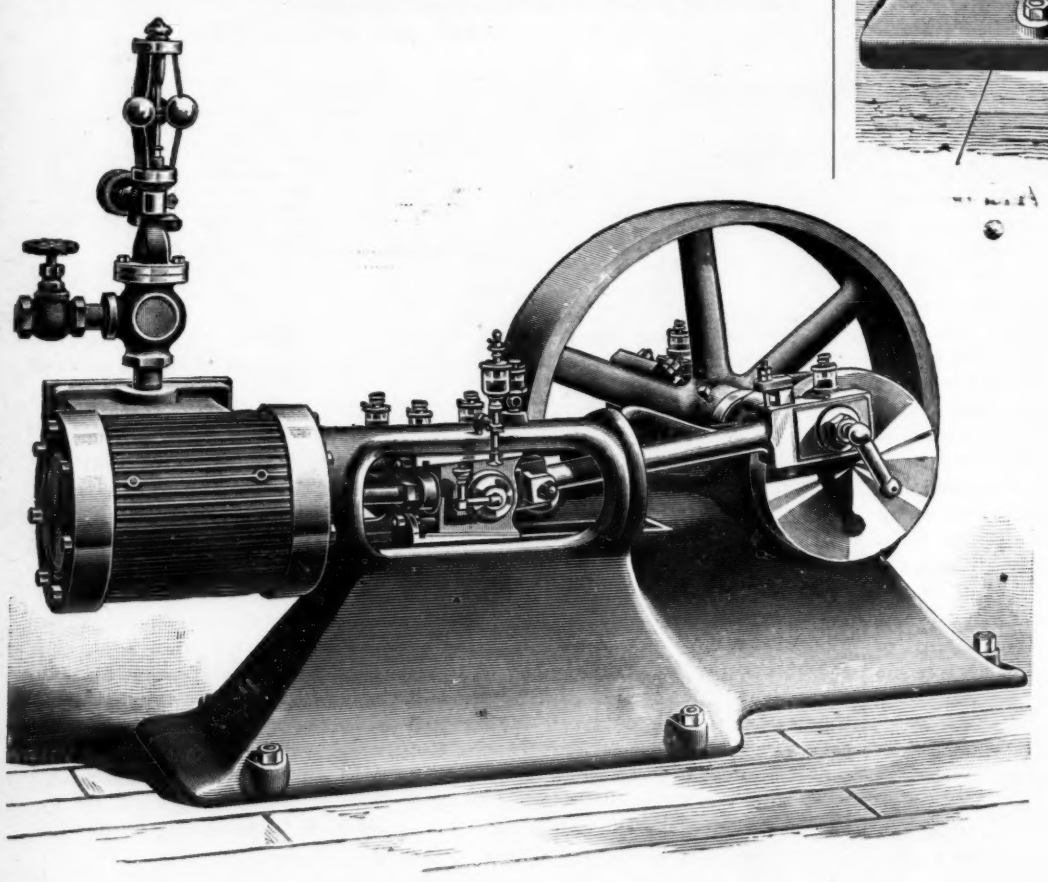
The Forged Steel Car Wheel Co., of New Jersey, is developing a process for forging steel car wheels from the ingot, under the patents of Mr. J. A. Facer, of Germantown, Philadelphia. Experiments have been recently made at the works of the Buffalo Steam Forge Co., where four wheels have been made. The process is carried out by two hammers with the requisite dies. The ingot of open-hearth steel is placed under the first hammer, which contains dies by which it is first hammered on the circumference and then reduced approximately to the thickness of the finished wheel. Then by means of other dies the thread and flanges are hammered into shape. At the end of this stage the wheel is of uniform thickness throughout and the formation of the hub has not begun. The wheel is then put under the second hammer, under which the hub is formed and the metal between the hub and the tire reamed out to the necessary thickness of plate. It is expected to make the wheel as light as a chilled cast iron wheel of the same diameter and to sell it for much less than any steel wheel has yet been offered at. Negotiations are in progress looking to the establishment of works which it is expected will soon be erected.

THE METROPOLITAN STRAIGHT-LINE SELF-CONTAINED ENGINE.

In the selection of an engine, as of anything else, the question of cost will be one of the most important of the factors which influence the purchaser. The subject of the present illustration is an engine which has been designed to be manufactured and sold at a price within the reach of every steam user, and still to give to the purchaser an engine which will be in no way "cheap" in the odious significance of that term, but which will do good work for a long term of years. The disposition of the metal has been such as to secure strength, symmetry, durability and accessibility. The guide portion of the frame is cast in the form of a hollow cylinder, the front side being removed to give access to the crosshead, and the edges of the opening strengthened. A strengthening ring is also cast about the end next to the crank, which firmly connects the top guide with the bed, avoiding any tendency to spring. The form of the bed is, as will be seen, such as to give great rigidity and an ample base, so that the engine runs very steadily upon no other foundation. The bed is extended beyond the main bearings as well as at the cylinder end, at an angle of 45 degrees, and includes the outboard bearing, making the machine self-contained, setting entirely upon its own base and requiring no erection. The space between the main and outboard bearings is sufficient to admit the eccentric, governor belt pulley and driving wheel, and when desired the shaft is prolonged beyond the outboard bearing for an extra pulley. The head or back end of the bed is turned and faced true with the guides, and forms the front head of the cylinder, which is of the overhanging type, and is scraped and bolted substantially to the bed, in such a manner as to secure perfect alignment and security against leakage. The piston rings are self adjusting, and are furnished with steel springs and set bolts. The piston rod is of steel, screwed into the cross head and secured with a jam nut. The cross head sets vertically and is provided with wedge-shaped shoes made of gun metal, which are easily adjusted on the studs with a nut on each side of the flanges.

The cross head pin is hollow, with drop oiler attached so as to oil when running. The connecting rods are of steel with solid ends, and gun metal boxes. The wedge-shaped keys are brought against a plate which covers the whole box face, and are adjusted and secured by nut and lock nut upon a flange at their larger end instead of by driving. The crank shafts are of hammered iron and the cranks of the disc form, counter-balanced and highly finished. The crank pins are of steel and have a centrifugal oiler bolted on the end which allows the pin to be oiled while running. The eccentric rod and valve stems are of steel and the connection between them is made through a square slide-bar, having a bearing on both ends. A plain D slide valve is used and the ports are ample in capacity: all parts are interchangeable and duplicates can be furnished at short notice. Donegan & Swift, 11 Murray street, New York, are the selling agents.





Some Staple Export Lines.

A cursory examination of the advertisements that appear in the pages of the *Australasian* and of the prices current of staple goods published in our paper will show that, with comparatively unimportant exceptions, they may be broadly classed under two heads, "hardware," which includes, of, course, the thousand-and-one nick-nacks and notions the American manufacturer produces in metals, exclusive of the bulky iron, steel and metal goods and machinery, and woodenware, a heading that must be supposed to cover everything made of wood that we export, except timber, rough, sawed and dressed lumber.

Taking the principle articles enumerated as hardware in the customs schedule, we find that our exports of this class of goods footed up, for the year ending June 30, 1889, the respectable value of $10,905,090, made up of the following items: Agricultural implements, $3,623,749; brass and manufacturers of, $321,137; cutlery, 102,252; firearms, $820,933; builders' hardware, $1,700,390 nail (cut and wire) and tacks, $448,146; saws and tools, $1,980,878; scales and balances, $301,496; stoves, ranges and parts, $273,261; lamps and gas fixtures; etc., $509,002; plated ware, $587,162; tinware, $236,733. —Total, $10,905,090.

Our best consumers for these productions were our immediate neighbors in British North America, the West Indies, Mexico, Central and South America; Australasia is a liberal purchaser, Japan takes a fair quantity of this class of goods, and European countries make up the bulk of the balance. It is a line for which there never can be a demand, except among the most progressive and industrious people, for the various articles composing it are all, in some way, connected with the improvement of home comforts, the perfection of some manufacturing process, etc.—[Australasian.

To Prevent Slipping of Belts.

Edwin A. Kimball, instructor in the shops at the University of Illinois, says on this subject: "I do not know that washing soda may not be as good as castor oil, for I never used the former; but I do know that castor oil is effective and safe in the hands of a competent person. There is no occasion to soak a belt in any sort of oil. A little applied to the surface is sufficient. There is nothing that I have ever tried that is so effective as castor oil, especially for the wood-working machinery belts. The way to apply it is to let it run from a bottle in a small stream on the belt while this is in motion, commencing at one edge of the belt, moving the stream over a little at every full travel of the belt, until the whole width of the belt has received its portion. I know of belts that have been treated in this way for years, and they are whole yet, and doing their work without a murmur."

THE production of basic Bessemer steel by the Aachener Hutten Actien Verein, of Rothe Erde, near Aachen, Germany, during 10 years ended 23rd of October last, reached the enormous total of 1,000,000 tons. To commemorate this event the Aachener Hutten Actien Verien has given £7,500 to its fund for providing for aged and incapacitated workmen.

THE new market building in Cleveland, will be a fine structure of steel, 400 feet long, inclosed with brick and stone. A central dome of iron and glass will surmount the main part, which will be three stories high.

EXPORTS of tinplates from Great Britain, during October, reached the enormous amount of 36,955 tons.

ABANDONING NEW ENTERPRISES.

Announcements are occasionally cropping out that projected industrial establishments have been given up by their promoters on account of the result of the late elections. In some cases it is stated that the persons interested have gone so far as to cancel contracts for machinery partly built, and to thus render themselves liable to damage claims which will mulct them in heavy losses. They evidently prefer to "to endure the ills they have" than to invest further large sums of money in enterprises which may now appear more or less speculative. The abandonment of new enterprises is, of course, confined almost entirely to lines which are directly affected by the tariff. These branches of trade are very sensitive to adverse influences affecting tariff legislation, and this action seems to be exactly what might have been expected. As to other industrial enterprises of a character not particularly affected by legislation, it is certainly too early yet to trace any adverse movement resulting from the late elections, and it is not our purpose to discuss this question broadly.

So far as additions to the capacity of existing works manufacturing staple lines are concerned, the wet blanket which has been thrown upon them is not an unmixed evil. In numerous directions we have been developing altogether too fast, and the check now imposed upon this growth may be salutary. We have unquestionably been rapidly approaching an industrial congestion. This is seen already in several lines, in which prices have fallen to an unremunerative point in the midst of a very large demand for such goods. Yet new works have been projected with a recklessness of results, which must in a short time have produced fruit in commercial disasters. Our blast furnace capacity has had enormous growth in recent years, and will soon be very considerably in excess of the requirements of the country, and such outside markets as we can easily reach. The development of new industries to consume more pig iron would by no means be sufficiently rapid to take care of the surplus threatened.

If the erection of more blast furnaces is checked, the owners of existing works can derive some consolation from that fact. Our rolling mills for the manufacture of both steel and iron have recently had important accessions to their numbers, and still more rolling mill schemes have been brought forward. If no more mills are built for some time the position of the works now in existence will be greatly strengthened. Every nail manufacturer has had to confront most embarrassing conditions during the past year, but this has not deterred the proposed erection of nail factories to largely increase the glut in that line.

The crowded condition of machine shops and engineering establishments, which has been such a marked feature of the past two or three years, has very sensibly been due to the great demand for the equipment of new works. This demand could not be continued indefinitely, as over-production of staple products would in time have called a halt in the establishment of new enterprises, entailing perhaps a long period of dullness until the demand again overtook the supply.

There are localities in which the abandonment of new enterprises will be keenly felt. Many towns in both the North and South have taken advantage of the activity in industrial development to offer inducements to capitalists to locate works in their vicinity. Real estate has been boomed on the mere announcement that a factory of some kind would be erected in the town. If the hopes of real estate speculators and ambitious business men have been suddenly blasted, it will be an unpleasant awakening for them from dreams of rapidly accumulating wealth. Their loss, however, may mean the gain of other sections, whose established industries will not mourn the non-existence of works which might have been serious competitors in an already crowded market. The result of the elections should not be constructed into a total overthrow of existing conditions. Let us hope that it may be more of a benefit than a disaster.—[Metal Worker.

A COLOSSAL COKE FIRM.

From the history of the coke trade compiled by General Manager Lynch, of the H. C. Frick Coke Co., for the souvenir presented to the members of the British Iron and Steel Institute on the occasion of their recent visit to the Connellsville region, we extract the following sketch of the origin and growth of the great company which now controls more than one-half the ovens in the region.

In 1871, the Mt. Pleasant & Broad Ford Railroad was built, opening up the northern end of the coke region. Henry Clay Frick was one of its projectors. In the same year he formed a partnership with A. O. Tintsman and Joseph Rist, under the firm name of Frick & Co., purchased 300 acres of coal near Broad Ford and built the original Frick works of 50 ovens. During the following year the plant was increased to 100 ovens, and the Henry Clay plant of 100 ovens was built. Oven-building was brisk during these two years, and at the close of 1872 there were 3,672 ovens in the region. In 1873 the great panic occurred. The iron business commenced to decline, and with it the coke business. For six years this unpromising condition continued. In 1876, Frick bought out his disheartened partners and continued operations alone with nothing but his nerve and an abiding faith in the future of the business to back him. In 1877, when the depression was greatest and the prospect most gloomy, he leased the Valley works, then the property of Willson, Boyle & Playford, and put them in charge of Thomas Lynch. Notwithstanding the dull times these works were operated every working day in the whole year except Christmas.

In the Fall of 1877, E. M. Ferguson, who owned the Ferguson works, now known as Parrish works, 70 ovens, on the Fayette County Branch, was taken into partnership by Frick, the firm name being H. C. Frick & Co. In 1878, Walton Ferguson, a brother of E. M. Ferguson, was admitted into the firm. During this year the Anchor and Mullen works were leased by the firm. This partnership continued until 1882, when the firm owned and controlled 1,026 ovens and 3,000 acres of coal. In January of that year, Carnegie Bros. & Co. were admitted into the firm, and in April following the H. C. Frick Coke Co. was chartered, with H. C. Frick as President. The capital was then $2,000,000. It has since been increased to $5,000,000.

During all these years the company has been adding to its holdings until it now controls 35,000 acres of coal and 9,154 out of the 15 805 ovens in the region. It also owns 35 miles of railroad track, 1,200 railroad cars, 23 locomotives, 3 water plants with aggregate pumping capacity of 5,000,000 gallons per day, 72 pairs of stationary engines and 192 steam boilers. It employs 11,000 men and owns 816 head of horses and mules.—[Connellsville (Pa.) Courier.

TESTING ARMOR AT LOW TEMPERATURE.

The Ordnance Bureau of the Navy Department made a test at Annapolis to determine the question whether the resistance of nickel steel armor plate is affected by low temperatures.

The plate which had received five shots previously, was fired at twice—once before freezing and once afterward. A 6-inch gun was used, with a powder charge of 44½ pounds and a 100-pound Holtzer shell, giving a muzzle velocity of 2,081 feet and striking velocity of 2,055 feet per second. The gun was placed 263 feet from the plate. The point of impact of the first shot made before the temperature of the plate was reduced was 15 inches from the left edge. The projectile penetrated until the point entered the wood backing, reaching a distance of 13½ inches from the face of the plate. It rebounded and was picked up 40 feet from the plate entire, but 1-10 inch shorter and with its diameter slightly enlarged. The plate showed a crack 14 inches long, extending downward to the left edge of the plate, and another 13 inches long horizontally, both apparently through cracks. There were other surface cracks.

The plate was then put through the freezing process as follows: A box 1 foot deep was built in front of the plate extending half way over the side plates. For the purpose of taking temperature a hole was drilled 10 inches deep in the top of the plate and 1½ inches from the backing. The bottom was filled with mercury sufficient to cover the bulb of a thermometer, and a pipe well protected with non-conducting materials and long enough to pass through the freezing mixture was inserted. The shot remaining in the lower left half impact was used as the second point for taking temperature. The bore plug was removed, a thick wood plug was passed through the freezing mixture, and a hole was drilled in the plug large enough to admit the thermometer. The freezing mixture was made of ice and salt. The temperature continued to fall slowly for three hours, when it reached 28° F.

The second shot was then fired, all the elements being the same as in the preliminary round. The projectile this time broke up badly, about one-half remaining embedded in the plate and the other part breaking into numerous pieces. A triangular piece of plate 26 inches across the top broke off and was thrown 25 feet in front of the plate. A wide, gaping crack connected the impact with shot No. 3 of the competitive test, and two small surface cracks 2 inches long appeared. A surface crack 17 inches long started from No. 3 impact toward the left edge. Numerous old cracks were opened and enlarged and other new ones made, the longest being 24 inches. The upper part of the right side plate was moved 2 inches to the right.

It was noticed that with the exception of two cracks the injury of the plate was in the neighborhood of previous fractures. The perforation of the last round was very similar to the shot before the freezing, and in the opinion of the officer conducting the trial did not indicate any extra hardness or brittleness of the plate due to its temperature. The only point that indicates such a change was in the breaking of the projectile, though it is not certain that the projectile was not a poor one. Another shot will probably be fired at the plate after it has been cooled to a lower degree than at the last trial. Physical tests will then be made of specimens subjected to different degrees of cold.

Improved Tinplate Process.

Among the abstracts of British patent specifications, as published, is mentioned an improved tinplate process, gotten up by I. Bang and A. Ruffin, of Paris, France. It is usual to cover the bath of molten tin used to coat the plates by a layer of oil or tallow, for the purpose of preventing the oxidation of the tin both in the bath, and on the plates when they are removed and are hot. The use of this oil has many serious disadvantages; it is a constant danger of fire, and has to be removed from the plate while it is still hot, by an expensive scouring operation. If the grease is removed from the plate too early in the process, the coating of tin assumes a blue and yellow tint, losing its brilliancy. A complete removal of the grease has to be effected generally by a final cleansing with turpentine. By the application of the invention to the process of tinning the oil is dispensed with. The tinning is conducted in a chamber deprived of free oxygen, but filled with a carbonaceous gas, or air, deprived of free oxygen by bringing it in contact with incandescent fuel. The chamber in which the process is conducted has a glass top, to observe the operations, and has enclosed in it the tanks containing the hydrochloric acid and molten tin. The dipping is conducted by manual labor, leather sleeves being provided in the top of the chamber through which the men thrust their hands, and manipulate the plates. An endless chain conducts the plates, after they are dipped, to a series of cooling chambers before they are exposed to the atmosphere.

Christmas and New Year's Excursions via Valley Railway.

On December 24, 25 and 31, 1890, and January 1, 1891, the Valley Railway will sell excursion tickets from all stations on their line, at one and one-third fare for the round trip. Tickets good going on the day of sale, and good returning up to and including January 5, 1891. For further information apply to agents, or J. B. Caven, Gen. Pass. Agent, Cleveland, O.

INDUSTRIAL SUMMARY.

New Enterprises:—

A plow factory is being erected at Tuscumbia, Ala., by T. T. Roland & Son.

A foundry and machine shop will be established at Austin, Tex., by the Lone Star Ice Works Co.

Gilbert & O'Neil have incorporated the Sheffield (Ala.) Iron Works to operate their plant at Sheffield.

The Virginia Steel Car Co. have been organized at Glasgow, Va., to erect and operate steel car works, previously reported.

A company is reported organizing at Mexia, Tex., for the purpose of establishing agricultural implement works at that place.

A company is being organized at Covington, Va., by W. A. Rinehart and others to establish an iron foundry and machine shops.

A press dispatch from Reading, Pa., announces that a new company has been organized there to manufacture iron of old steel rails.

An agricultural implement works will probably be established at Mobile, Ala., by W. C. Maynard and J. O. Manton, of Northampton, Mass.

The St. Lawrence Iron Bridge Co., Montreal, Can., has been incorporated with a capital stock of $25,000, to manufacture iron bridges, iron beams, etc.

The Goshen Car & Railway Equipment Co. are a new organization at Goshen, Va., who are preparing to build a car works and manufacturing plant.

The Princess Iron Co., at Iron Gate, Va., has been organized for the purpose of enlarging an iron furnace, establishing a rolling mill and other industries.

J. C. Moulton, of Laconia, N. H.; J. F. Nickerson, of Boston, Mass.; J. M. Lunt, of Boston, Mass., and others have incorporated the Beaumont (Tex.) Car Works, recently mentioned as organized.

The Richmond Standard Spike & Iron Co., of Manchester, Va., has incorporated with Byrd Warwick, President, and J. T. Anderson, Secretary; and, it is stated, increased its capital stock to $240,000.

The Alabama Pipe Co. have been organized at Bessemer, Ala., to manufacture plumbers' supplies. The officers are F. H. West, President; A. F. Dexter, Vice-president, and D. McK. Sinclair, Secretary.

Messrs. J. G. Allan, of Hamilton, Ont., and R. J. Hay, of Cleveland, O., are erecting a factory in the former city for the manufacture of foundry facings. They expect to have it in operation in a few weeks.

Cooke's Safety Switch & Railway Improvement Co. has been incorporated at East St. Louis, to manufacture a safety switch; capital stock, $100,000; incorporators, E. J. Crandell, W. G. Parkhurst, C. C. Whitney.

The Eureka Safe & Lock Co., with a capital stock of $50,000, have been incorporated at Covington, Ky., to build and operate a safe and lock plant. The incorporators are E. S. Read, W. W. Hill, F. N. Read and others.

At Pensacola, Fla., the Moomaw Automatic Car Coupler Co. have been incorporated, with a capital stock of $50,000, by H. E. Moomaw and others. A foundry will be erected for the purpose of manufacturing the Moomaw patent coupler.

On December 11 an application will be made for a charter for the Pennsylvania Foundry & Machine Co., of Pittsburgh, Pa. The incorporators are: Theodore Doerflinger, George P. Leshe, William J. Woods, Florence C. Miller, Morton Hunter and John M. Griffin. The foundry will be located in that city.

Enlargements, Additions, Removals, Etc.:—

The Alabama Great Southern Railroad Co. is reported as to build repair shops, at Attalla, Ala.

The Batesville Iron Works will probably add an iron foundry to its machine shops, at Batesville, Ala.

The Chattanooga (Tenn.) Car & Foundry Co. is rebuilding its foundry which lately was burned.

The Tacoma (Wash.) Foundry & Machine Co. are erecting a large bolt shop in connection with their works.

A large hardware factory, 100x50 feet, will be erected by the Spring City Hardware Co., at Spring City, Pa.

A foundry and machine shop have been added to the Eward Rash Iron Railing Works, at Florence, Ala.

D. R. Wing & Co., of Little Rock, Ark., will add to their foundry and machine shops a blacksmith shop, 50x100.

The Cahill Iron Works, at Chattanooga, Tenn., is reported as enlarging and increasing the capacity of its iron foundry.

Additional machinery is being added to the plant of the Mossy Creek Foundry & Machine Co., at Mossy Creek, Tenn.

The branch of the Cambria Iron Co.'s Works, located at Cumberland, Md., is being enlarged, and new machinery will be put in.

The Enterprise Machine Works, of Knoxville, Tenn., have recently added much new machinery, and are preparing to add an iron foundry.

It is stated that the Aldine Safe Co., of Cincinnati, O., will remove their plant to Youngstown, O., if the citizens of that place will offer sufficient inducements.

The B. D. Hind Agricultural Implement Works, recently burned at Pine Bluff, Ark., will be rebuilt at Stuttgart, Ark., and work on the new plant has commenced.

The Taylor Manufacturing Co., Chambersburg, Pa., has closed a contract for the removal of its engine works to Bedford City, Va., and a $200,000 stock company is to be organized to operate the plant.

R. E. Sandford, of Columbus, O., is reported as having purchased the iron foundry and machine shops of the Laredo Foundry & Machine Co., at Laredo, Tex., and will put in $7,000 worth of new machinery and operate the same.

The new foundry of the Dubuque (Ia.) Brass & Metal Co. will be completed in about a month, by the addition of which the capacity of the works will be nearly doubled. The machine shop is 100x60 feet, two stories in height, while the molding department is 100x40 feet, one story high. New and improved machinery will be put in, and a new system for melting brass will be introduced.

The Jefferson Iron Works, of Steubenville, O., will soon commence to rebuild their rail factory, recently destroyed by fire, and also the iron building covering the rolls, forge, engine, boilers and shaft. The building will be practically fire-proof, with iron pillars and girders, and the roof will be of corrugated iron. The structure will be 200 feet long, 80 feet wide and 25 feet in height.

E. U. Scoville, Manlius, N. Y., is about completing, and will occupy at an early date, a new foundry, for the manufacture of medium and light gray iron castings, etc. The new building is an addition to the old plant established 50 years ago, and gives an additional space of 120 feet front by 45 feet deep, with a capacity of six to eight tons daily. A Colliau cupola is employed, and the works are otherwise newly fitted for the present demands of the business.

The plant of the Sterling Steel Co., located at Demmler, near Pittsburgh, Pa., has resumed operations, after an idleness of two weeks for repairs and additions. During the stoppage a new battery of four boilers was put in, a new building 35x72 feet, was erected. A steel stand pipe, 65 feet high, was also erected, which will give them an ample supply of water. Some of these changes were made necessary by the fact that the works have returned to the use of coal.

Fires and Accidents:—

At the Bellaire Stamping Works, on November 22, the two original buildings of the company were completely destroyed by fire. One hundred thousand dollars' worth of machinery was wrecked, most of it being rendered useless; $50,000 was the cost of the two buildings destroyed, and besides this great loss there was a large lot of partly worked up stock of every description in the buildings. The cause of the fire was an explosion in the japanning and chemical departments. he company places its loss at $100,000, with insurance of something over half that amount. The works will be rebuilt at once.

General Industrial Notes:—

The steel plant at the Bellaire (O.) Nail Works has just made its banner output, finishing 2,007 tons of slabs and billets.

William Tod & Co., founders and machinists, of Youngstown, O., have received a large order for machinery for the new rail mill of the Pennsylvania Steel Co., at Sparrow's Point, Md.

An immense casting was poured recently at the works of the Bethlehem, (Pa.) Iron Co. Six cupolas were required to melt the required amount of metal. The casting is to be used in the construction of the armor plate mill in the ordnance department now in course of erection.

Hamblin & Russell Manufacturing Co., Worcester, Mass., manufacturers of hardware specialties and standard wire goods, automatic machinery and special tools, have just put on the market a new specialty in a rolled thread, flat tip coat and hat hook. It possesses some new features which will be appreciated by the users. Samples will be sent to the trade on application.

The Totten & Hogg Iron & Steel Foundry Co., Pittsburgh, Pa., are having a large demand from all parts of the United States and foreign countries for the Forster rock and ore breaker manufactured by them. They have just shipped a crusher to Japan, and a car load to the Pacific coast, and have received an order from Nova Scotia, and are now negotiating with parties in Riga, Russia; Berlin, Prussia; Sydney, New South Wales, and several parties in different localities in South America.

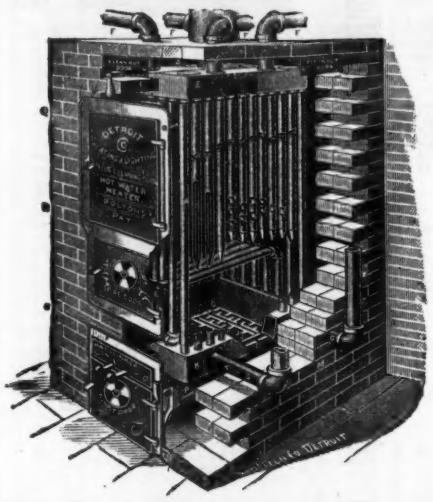
The Hazelton Tripod Boiler Co., 170 Twenty-second St., Chicago, are doing a splendid business, with an influx of orders from all portions of the country. The reputation of these boilers is now well established. They shipped last week a 50 horse-power boiler, purifier and heater, to Parral, Mexico; also the second 500 horse-power boiler for the Citizen's Street Railway Co., of Indianapolis, Ind. They regard the outlook as very promising, and anticipate an increased volume of business as the season develops.

On November 20, 1886, the blast furnace of the Girard Iron Co., at Girard, O., commenced their present blast. It has been in continual operation ever since with the exception of the banking of the furnace twice, once by reason of a coke strike and again by reason of a strike of the furnacemen. During the entire four years the loss of time from all causes amounted to 80 days. Up to the 20th ult. the furnace had turned out 215,000 tons of iron, and is now averaging 170 tons per day, and from present appearances will continue in blast for some time to come. The furnace is owned by A. M. Byers, of Pittsburgh, while Henry B. Shields, of Girard, is manager.—[Iron Age.

The use of wire and picket fences made on the ground by hand fence machines has been constantly increasing for some years, and there is a constant demand for the pickets throughout a large section of the country. This has, in turn, created a demand for a suitable saw mill that will manufacture such pickets as are used in the fences. The Battle Creek Machinery Co., of Battle Creek, Mich., undertake to supply this demand by furnishing a saw mill every way suited to the manufacture of these pickets, as well as to do other work of the same general character. The mill is furnished at a price within reach, and is very durable as well as easily operated. It is especially suitable to be run by the traction engines in common use for running threshing machines. When threshing season is over the owner of an engine, by procuring one of these saw mills, can find work for his engine the remainder of the year instead of permitting it to rust out. There is money in the business. For further particulars and prices address the Battle Creek Machinery Co., Battle Creek, Mich.

An estimate of the extensive business in the manufacture of architectural sheet metal work and roofing conducted by W. J. Burton & Co., Detroit, Mich., can be gathered from the following: This season's trade alone in one place, Coldwater, Mich., will reach several thousand dollars, which consists of galvanized iron cornices, roofing sundries and more especially the extensive

BOLTON



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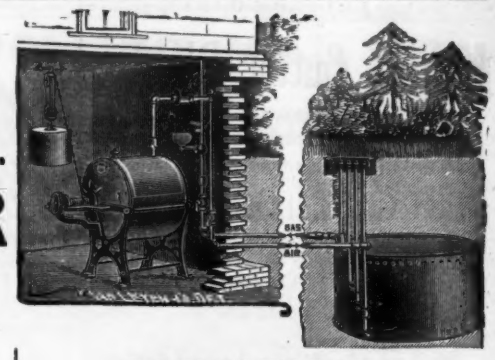

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sale of their famous "Eastlake" metal shingles, which were used in and around the above named city. The "Eastlake" shingles have become a general favorite for roofing and siding wherever they have been introduced and are giving universal satisfaction. They are highly recommended to any one needing a first-class roofing material. Recent shipments embrace Virginia, West Virginia, North Carolina, Ohio, Mississippi, Texas, Missouri, Indiana and various points in Michigan. Estimates cheerfully furnished from plans, and full information and particulars can be obtained by addressing the above named firm.

The Iron Trade Review, o Nov. 20, contained an item stating that the locomotive and machine works of Adams & Price, Nashville, Tenn., had been destroyed by fire, and that they would undoubtedly rebuild. Under date of Nov. 24, they write us as follows: "The fire occurred on the evening of the 10th and on the 12th we began preparations to rebuild (the 11th being Sunday). Up to this date we have building: machine shops, foundry, engine and boiler rooms, blower room, cupola-rooms and main office and drawing room about ready for roof, and expect to move into our new foundry by the 10th of December. Our new blacksmith shop, pattern shop and pattern storeroom will not be built before next Spring as it is too late in the season to start masonry now to stand through our uncertain Winter weather without the probability of being damaged. We will be in the market for a complete outfit that constitutes a first-class plant, having bought nothing so far except one car load of machine tools. Will have to buy two engines and boilers for power plants, three cranes—two for foundry and one for machine shop, and later on one for loading and unloading cars in yard, one transfer table and various other appliances. We will want for pattern shop a band saw, and one universal saw table and pattern lathe, all of modern style and latest improvements. We are now building from experience and will have fire-proof buildings, and the best tools, fixtures, and appliances to be had as we go. No second-hand dealer need apply."

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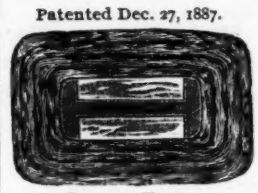

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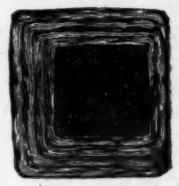

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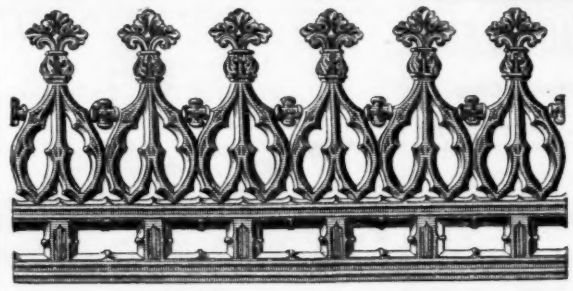

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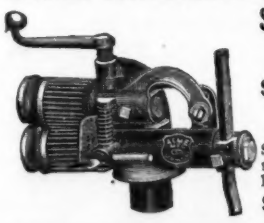

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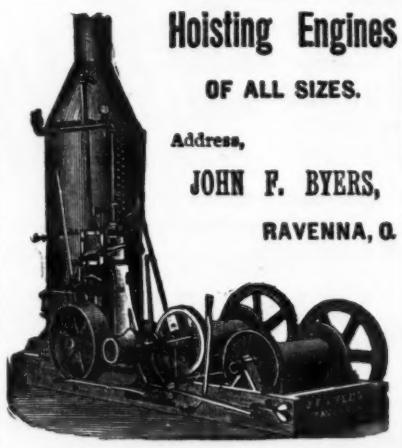

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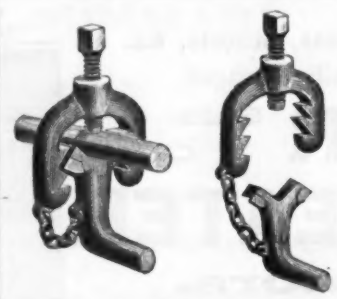

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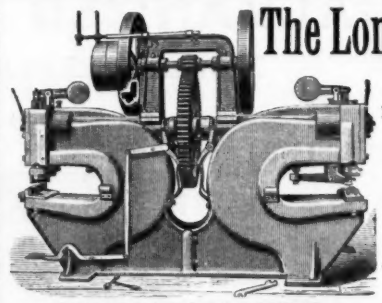

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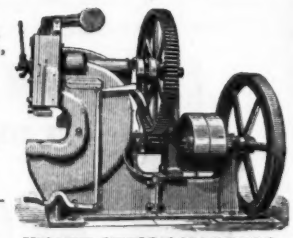

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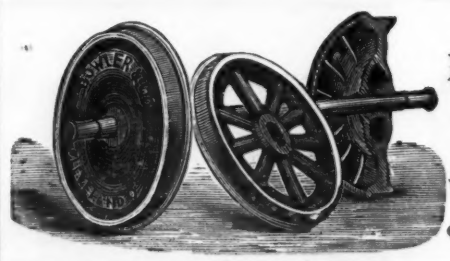

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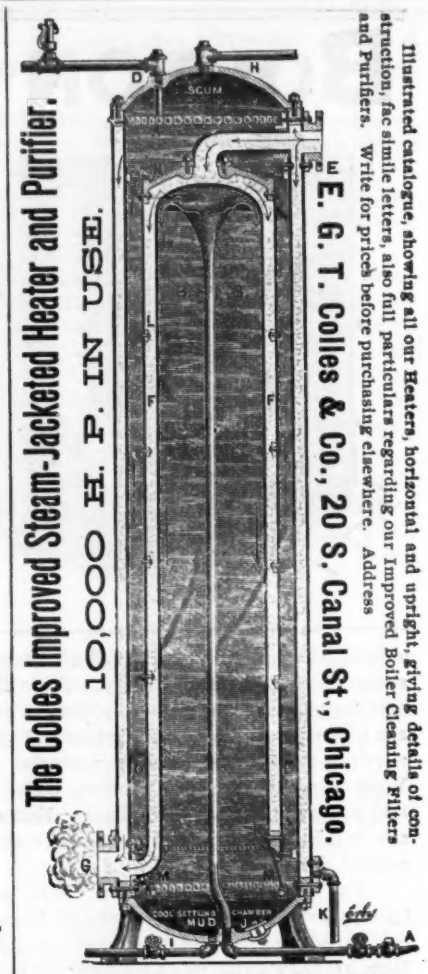
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LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $15 00@15 25; Southern coke No. 2, $14 25@14 50; Southern coke No. 3, $14 00@14 25; Mahoning Valley (Lake ore mixtures), $17 75@18 75; Southern charcoal, No. 1, $17 00@17 50; Southern charcoal, No. 2, $16 50@17 00; Missouri charcoal, No. 1, $18 00@18 50; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke, $13 75@14 00; Cold short, $13 75@14 00; Mottled, $12 75@13 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $22 00@23 00; Southern (other brands), $18 00@19 00; Lake Superior, $22 50@23 00.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 75@16 25; Southern Coke No. 2, $14 75@15 25; Southern Coke No. 3, $14 25@14 75; Southern Grey Forge, $13 75@14 25; Southern Charcoal No. 1, $17 50@18 00; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $16 00@16 50; Missouri Charcoal No. 2, $15 50@16 00; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $21 75@22 25; Southern, $19 00@22 50. CONNELLSVILLE COKE—East St. Louis, $5 65; St. Louis, $5 80.

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LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 75@15 25; Southern Coke No. 2 Foundry $14 25@14 75; Southern Coke No. 3 Foundry $13 75@14 25; Grey Forge, $13 25@13 75; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $17 50@18 50; Southern Car Wheel, Standard brands, $22 50@23 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 00@17 25; No. 2 Foundry, $16 00@16 25; Grey Forge, $15 00@15 25; White and Mottled, $14 00@14 25; Warm Blast Charcoal, $18 00@21 00; Cold Blast Charcoal $23 00@27 00; Bessemer, $17 00@17 50.

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1½ to 4 by ⅜ to 1 inch	1 95
4½ to 6 by ⅜ to 1 inch	2 05
1½ to 6 by 1¼ to 2 inch	2 35
1¼ & 1¾ by ⅜ to ¼ inch	2 05
1 & 1¼ by ⅜ to ¼ inch	2 15
⅛, ¼ and ⅜ by ⅜ to ½ inch	2 35

Round and Square.

1 to 1⅜ inch	1 95
2 to 2¼ inch	2 15
2¼ to 3¼ inch	2 45
3¼ to 4 inch	2 95
4¼ to 4½ inch	3 45
4¾ to 5 inch	3 65

Oval.

⅜ to 1¼ inch	2 35
⅜ to ¾ inch	2 55
½	2 75
⅝	3 15

Half Oval and Half Round.

1¼ to 3 inch	3 05
⅜ to 1¼ inch	2 65
⅜ to ¾ inch	3 25
½	3 45
⅝	4 95

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	2 15
1 to 1¾ by ¼ and 5-16 inch	2 25
¼ to ⅜ by ¼ and 5-16 inch	2 45
¼ to ⅜ by ½ and 5-16 inch	2 95

Hoops.

1¼ to 4, Nos. 13 to 15	2 75
1¼ to 2, Nos. 16 to 18	2 85
1¼ to 2, No. 19	2 95
1¼ to 2, No. 20	3 05
1¼ to 2, No. 21	3 15
1¼ to 2, No. 22	3 25
15-16, 1 and 1¼, Nos. 13 to 15	2 95
15-16, 1 and 1¼, Nos. 16 to 18	3 05
15-16, 1 and 1¼, Nos. 19 and 20	3 15
15-16, 1 and 1¼, No. 21	3 25
15-16, 1 and 1¼, No. 22	3 35
⅞, Nos. 13 to 15	3 15
⅞, Nos. 16 to 18	3 25
⅞, Nos. 19 and 20	3 35
⅞, No. 21	3 45
⅞, No. 22	3 55
13-16, Nos. 13 to 15	3 35
13-16, Nos. 16 to 18	3 45
13-16, Nos. 19 and 20	3 55
13-16, No. 21	3 65
13-16, No. 22	3 75
¾, Nos. 13 to 15	3 45
¾, Nos. 16 to 18	3 65
¾, Nos. 19 and 20	3 75
¾, No. 21	3 85
¾, No. 22	3 95
11-16, Nos. 13 to 15	3 65
11-16, Nos. 16 to 18	3 85
11-16, Nos. 19 and 20	3 95
11-16, No. 21	4 05
11-16, No. 22	4 15
⅝, Nos. 13 to 15	3 95
⅝, Nos. 16 to 18	4 15
⅝, Nos. 19 and 20	4 25
⅝, No. 21	4 35
⅝, No. 22	4 45
⅝, No. 23	4 65

Light Band.

1¼ to 6 by ¼ to 3-16 in	2 35
1¼ to 6 by Nos. 11 and 12	2 45
1 to 1¾ by ⅛ to 3-16 in	2 55
1 to 1¾ by Nos. 11 and 12	2 65
⅜ and 13-16 by ⅛ to 3-16 in	2 85
⅜ and 3-16 by Nos. 11 and 12	2 95
¾ and 11-16 by ⅛ to 3-16 in	3 15
¾ and 11-16 by Nos. 11 and 12	3 25
½ and 9-16 by ⅛ to 3-16 in.	3 45
½ and 9-16 by Nos. 11 and 12	3 55
⅝ by ¾ to 3-16 in	3 75
⅝ by Nos. 11 and 12	3 85

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⅜ inch, beveled edge, by Nos. 11 and 12	2 95
⅜ inch, " " " 13 and 14	3 15
¾ inch, " " " 11 and 12	3 25
¾ inch, " " " 13 and 14	3 45

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No. 10 to 14	2 65
No. 15 to 17	2 80
No. 18 to 21	3 00
No. 22 to 24	3 20
No. 25 to 26	3 35
No. 27	3 45
No. 28	3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier	2 80
C No. 1, " "	3 05
C H No. 1 " "	3 30
C H Flange, " "	4 05
Extra Flange, "	4 55
Solid Fire Box "	5 30

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Tank	3 00
Shell	3 40
Flange	3 70
Marine Flange	4 10
Fire Box	4 80

Above includes plates 90 inches wide.

90 to 96 in. wide	⅛c ℔ extra
96 to 100 in. wide	1 c "
100 to 104 in. wide	1⅛c "
104 to 116 in. wide	special

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ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	09
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7-16 to ⅜ and 2⅜ to 3 in	10½
3⅛ to 4 in	11
⅜ to 11-16 and 4⅝	10½
⅛ to 6 in	11½
¼ to 9-32 and 6¾ to 7 in	12
3-6 in	14

Flats.

	cts. ℔s
2 to 9-16 wide by 2 to ⅜ thick	7

Bessemer and O. H. Steel.

Machinery	base price,	3 00
Tire	"	3 00
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English Tool Steel.

Jessop's	16c
Hobson's "Best"	16c
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⅛, ¾, 11-16 and ¾ inches diameter	4 00
Bridge ⅛, ¾, 11-16 and ¾ inch diam	4 00

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Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	13 00

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Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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MANUFACTURERS OF

SHEET IRON AND SHEET STEEL

Squared Roofing Sheets a Specialty.

CAMBRIDGE REFINED IRON TRADE MARK

CAPACITY RANGES FROM No 30 TO 26 INCHES WIDE TO 1-4 x 40 x 120

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OFFICE AND WORKS CAMBRIDGE, OHIO.

Cleveland Iron Mining Co.,

Mercantile Bank Building,

CLEVELAND, O.

Organized 1850.

Total Production to Date, 4,200,000 Gross Tons.

Dealers in Lake Superior iron ore from their own mines at Ishpeming, Mich.

Specially adapted for making strong, tough iron, and for carrying large proportions of mill cinder and cold short ores.

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BOILER TUBES.
PLATE STEEL.
BOILER RIVETS.
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BAR IRON.
BAR STEEL.
STEEL AND IRON ANGLES.
SHEET IRON.
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RAILROAD AND BOAT SPIKES.
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STEEL RAILS AND CASTINGS.
GALVANIZED SHEET.
PORTABLE FORGES.
RAILROAD AND MACHISTS' SUPPLIES.

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Telephone 95. CLEVELAND, O.

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DEALERS IN

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FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,

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AND METALS.

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JAS. PATTERSON, Sales Agent.

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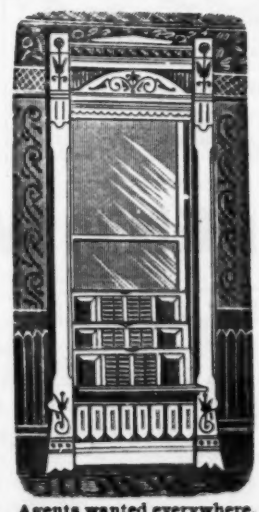

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MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9¼

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's.... dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shultz Raw Hide Leather Belting, single.....dis 40
Shultz Raw Hide Leather Belting, double and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.,.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¼@10¼

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12½ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3½

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1⅜".....dis 50&10
Morse Taper and Straight shank Larger than 1⅜".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6½c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@55&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	⅞	1
Square	8	7	5½	4½	4	3½	3⅛	
Hexagon	15½	11½	8½	6	5⅛	5⅛	5	
Washers	9	8	7	5	4½	4⅛	4⅛	

In lots less than 100 lbs, ₩ lb add ½c., 1lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate
{ Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 70@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Plumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¼
Sisal, ¼ inch and over.....₩ lb 13¼

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 45
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Circular Saws.....dis 50
" Mill, Mulay and Drag Saws..dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron.....dis 50
Round head iron.....dis 40
Flat head brass.....dis 45
Round head brass.....dis 35
Square Cap.....dis 65
Hexagon Cap.....dis 60
Set C. H. C. P.....dis 70
Machine, flat head, iron.....dis 65
Machine, round head, iron.....dis 60
Bench and hand—
Lag or coach.....dis 75@75&10
Coach, patent gimlet point.....dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 50
Pulley Taps.....dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ½ lb Balls		21c@29c
No. 18 " " ¼ and ½ "		18c@28c
No. 36 " " ¼ and ½ "		16c@27c
2-Ply Hemp, ¼ & ½ lb Balls (Spring Twine)		11½c
3-Ply " 1 lb Balls		12@12½c
3-Ply " 1½ lb Balls		11@11½c
Cotton Wrapping, 5 Balls to lb		15@16c

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

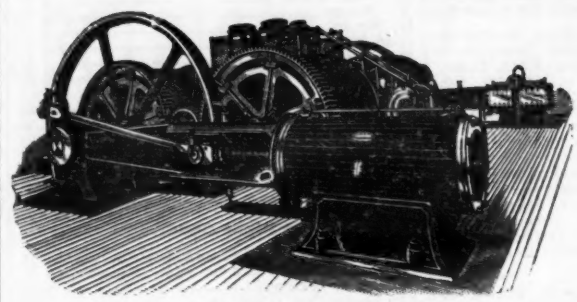
New List, Jan. 18, 1884

Brass and copper.....dis 20@25
Bright and annealed, Nos. 0@18...dis 70&10@75
" " Nos. 19@26..dis 75@75& 5
" " Nos. 27@36..dis 75&10& 5
Coppered Nos. 0 to 18, market list..dis 70@70& 5
Galvanized Nos. 0 to 18 " "..dis 65&5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....$6.00@lb dis 3

Wrenches.

Coe's genuine,.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanics'.....dis 55&10,& 3
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 10
William's " " .....dis 10
Alligator " " .....dis 40

Webster, Camp & Lane Machine Co.



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Improved Band Friction Hoisting Machinery, Geared or Direct Acting, for round or flat rope.

Wire Rope Haulage Machinery,

Endless or Tail Rope Systems.)

CORNISH PLUNGER AND BUCKET LIFT PUMPS.

Automatic or Slide Valve Steam Engines, Sheaves, Cages, Buckets, Etc.

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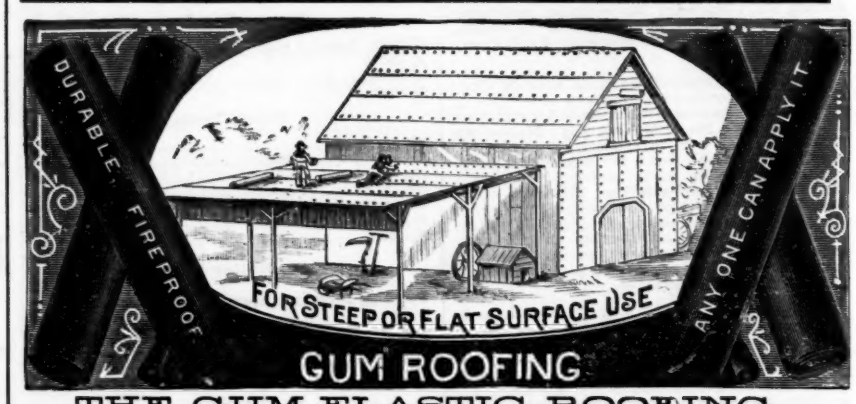

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CLEVELAND, O.
LIGHT AND HEAVY
IRON CASTINGS.
DAILY MELTING CAPACITY 75 TONS—SPECIAL FACILITIES FOR ECONOMICALY TURNING OUT SMOOTH CLEAN CASTINGS.
DUPLICATE WORK A SPECIALTY

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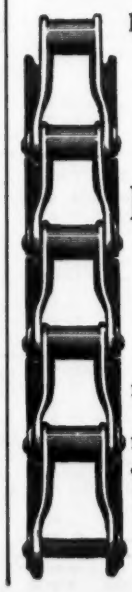
CHAIN BELTING,



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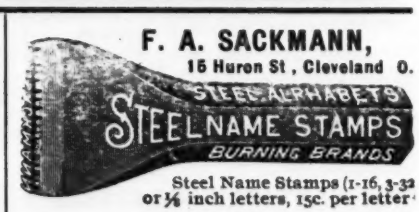

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BUILDERS OF
WOOD WORKING MACHINERY.

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SOLICITOR & COUNSELLOR, City Hall Room 48.

PATENTS THOMAS P. SIMPSON, Washington, D. C. No atty's fee until Patent obtained. Write for Inventor's Guide.

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On or about December 1, 1890, we will remove our entire plant to the new Vincent building, on Vincent street, between Music Hall and the Hollenden, now occupied by the Dangler Stove & Manufacturing Co. We shall take the entire building, which has a frontage on Vincent street of 47 feet, a depth of 100 feet, and an aggregate floor space of 24,000 square feet. Of this space we will rent to the right parties about 5,000 square feet, with power. The building is located in the centre of the important business district on Euclid avenue and Superior street, and was especially designed and constructed for power purposes. It is lighted on three sides, is equipped with large freight elevator, is heated with steam, and has gas and water on all five floors. Terms reasonable. Apply to

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OIL ALWAYS BELOW BURNERS---BY USING OUR SYSTEM.
OUR SYSTEM IS INSURABLE IN ALL INSURANCE COMPANIES.
WE GUARANTEE INSURANCE WHEN PLANT IS INSTALLED ACCORDING TO OUR SPECIFICATIONS.

THE AERATED FUEL CO.,

425 MAIN STREET, SPRINGFIELD, MASS.

FORGING, WELDING, BRAZING, MELTING, ANNEALING, HARDENING, TEMPERING.

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SEND FOR CATALOGUES.

HARDWARE MARKET.

Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ℔ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ℔ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....℔ doz $8 00
Others.....℔ doz $7 00
Full polished.....℔ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Sargent's list
Carriage, common, new list.....dis 70&10&7
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&5
Loose joint, jap.....dis 70&5
Loose joint, jap. with acorns.....dis 70&5
Loose pin, acorns.....dis 70&5
Loose pin, japanned acorns.....dis 70&5
Loose pin, acorns, jap. plated tips.....dis 70&5
Wrought steel—
Wrought, fast joint, narrow.....dis 70&5
Wrought, fast joint, broad.....dis 70&5
Wrought, loose joint, broad.....dis 70&5
Table Butts, back flaps, etc.....dis 70&5
Regular inside blind.....dis 70&5
Light inside blind.....dis 70&5
Loose pin.....dis 70&5
Light loose pin.....dis 70&5

Carbonized Felt and Building Papers.

(POWERVILLE BRAND.)

	Per roll of 500 sq. feet.
Eberts Bros., Detroit.	
No. 1—Slaters'	$1.25
"A," Stringed Roofing, Light.	1.50
"B," Stringed Roofing, Medium	1.75
"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

MILCELLANEOUS.

Asphaltum, Trinidad Refined, ℔ ton	$30.00
Asphaltum, Fine Grade, ℔ lb	.08
Coal Tar Felt, 1 Ply, ℔ lb	.02
Coal Tar Felt, 2 Ply, ℔ roll 108 sq ft	1.42½
Coal Tar Felt, 3 Ply, ℔ roll 108 sq ft	1.85
Roofing Pitch, ℔ gal	.09

Chains.

Revised List.

Trace, 6½-10-2.....℔ pair 1.03
Trace, 6½-10-3.....℔ pair .92 } .....50&10
Trace, 7-10-2.....℔ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....℔ 05½@6
Jack Chain, Iron.....dis 75@75&5
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode } 5 and 5X 14 qt.	6 50	7 50	8 50
Pans, slop, 5 and 5X 14 qt	8 00	9 00	10 00
Basins, wash—			
10¾ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13½ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed 8 inch	4 00	4 50	5 00
10 and 11¼ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....℔ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 40
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 50&10
Richard's.....dis 30@30&10

Horse Nails.

	No. 10	9	8	7	6	
Ausable, ℔ M.	23	24	25	26	28	dis 40
Putnam, ℔ M.	18	19	20	21	23	dis 15
Essex						dis 25&10

Horse Shoes.

Burden, at factory.....℔ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....℔ keg $4 00
Mule Shoes, at factory.....℔ keg $5 00

Knobs.

Carriage, japanned.....℔ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60
Escutcheons and keys.....dis 60
Padlocks and padlock keys.....dis 70&10
Bell pulls, mineral, porcelain and jet.....dis 60
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....℔ gross $4.80

Plumbs and Levels.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....℔ doz $6 00
Bishop's O K.....℔ doz $5 25
Bishop's Pioneer.....℔ doz $3 75
Bishop's American.....℔ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@$6...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....℔ gross $15 00

Scales.

Hatch, Counter, No. 171.....℔ doz $21 00
Hatch, Tea, No. 161.....℔ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....℔ dos $18 dis 25

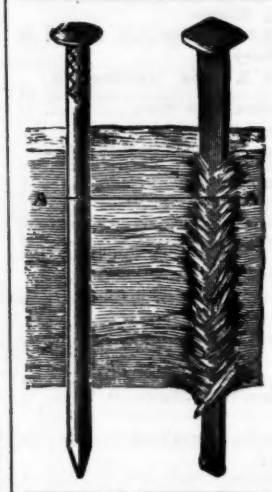
Squares.

Steel and iron, Nickel plated } dis 75&10@80
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 50&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds dis 70&10&10
Steel carpet tacks all kinds.....dis 70&10&10
Swedes iron carpet tacks, all kinds dis 70&10&10
Swedes iron tacks.....dis 70&10&10
Swedes iron Upholsterers' tacks..dis 70&10&10
Tinned Swedes iron tacks.....dis 70&10@10
Tinned Swedes iron Upholsterers' tacks.....dis 70&10&10
American iron cut tacks.....dis 67½&10&10
Copper tacks.....dis 50
Copper finishing and trunk nails.....dis 50&00
Cigar box nails.....dis 45&10
Finishing nails.....dis 6
Hungarian nails and miners' tacks.dis 62½&5
Gimp and lace tacks.....dis 70&5
" " " tinned.....dis 66&10
Trunk and clout nails.....dis 66⅔
Tinned trunk&clout nails.....dis 66&10&10
Basket nails.....dis 66&10&10
Chair nails.....dis 66&10&10
Common and patent brads.....dis 66&10&10



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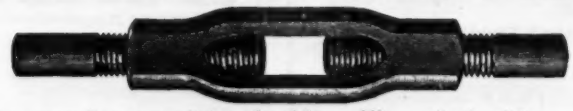

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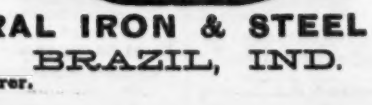

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BRAZIL, IND.

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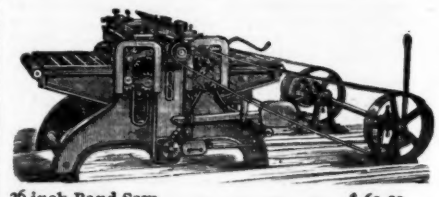

26 inch Band Saw,	$ 65 00
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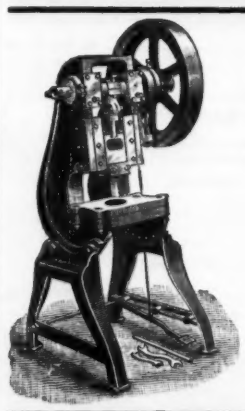

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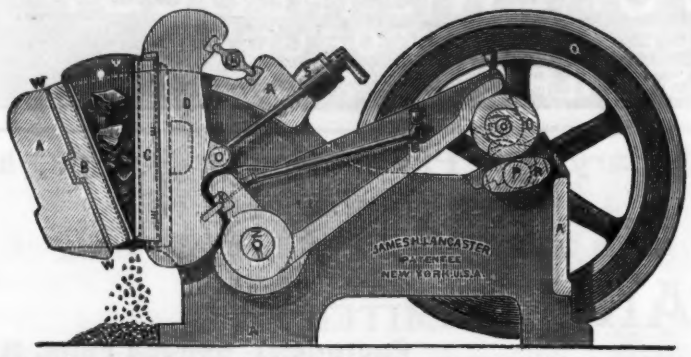

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	Arrive.	Depart.
N. Y. & Pitts. Express.....	‡5 38 a m	*8 25 a m
Fast N. Y. & Pitts. Express	*10 55 a m	*3 00 p m
Mahoning Accommo.....		†6 40 a m
Pittsburgh Express.....	†6 25 p m	
Youngstown Local.....	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom.....		†4 30 p m
Pittsburgh Express.....	†1 20 p m	11 10 p m
New York Express.....	*8 00 p m	.....

*Daily. †Daily, except Sunday. ‡Daily except Monday.

Cleveland & Canton Railroad.
(Standard Gauge.)

Depart for—
Zanesville and Coshocton—6:50 a. m., 3:00 p. m.
Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—
Zanesville and Coshocton—10:30 a. m.,6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.
Trains marked * run daily.

Valley Railway.
FOR AKRON, CANTON AND MARIETTA.
Depot foot South Water Street.

	Depart.	Arrive.
Valley Junction Mail.....	*7 25 a m	*6 30 p m
Marietta Express.....	*11 15 a m	*2 45 p m
Bal'o. & Wash. Express....	*4 30 p m	*10 25 a m
Cleve. and Canton Express	†6 30 p m	†8 15 a m

*Daily. †Daily, except Sunday.

J. T. JOHNSON, Gen. Supt. J. B. CAVEN, Gen. Pass. Agt.

From Cleveland Union Station.

PENNSYLVANIA LINES.

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Pittsburgh, Baltimore, Washington, Philadelphia and New York.	7 45 a m	d5 25 a m
	1 15 p m	12 50 p m
	d11 10 p m	6 35 p m
Wheeling and Bellaire.	7 45 a m	12 50 p m
	1 15 p m	6 35 p m
	*11 10 p m	.....
Alliance Accom.....	3 25 p m	10 10 a m
Ravenna Accom.....	5 00 p m	8 25 a m

d Daily. *Except Saturday. Other trains except Sunday.

From Cleveland Union Station.

Mt Vernon and Pan Handle Route

Cleveland & Pittsburgh R. R.

	Depart.	Arrive.
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon, Columbus, Xenia, Dayton, Cincinnati, Louisville, Indianapolis, St. Louis, and all points in the South and Southwest.	8 00 a m	d 7 00 am
	d 8 00 p m	5 40 p m
For Cuyahoga Falls, Akron, Orrville, Millersburg, Gambier, Mt. Vernon and Columbus.	1 15 p m	12 50 p m
For Cuyahoga Falls, Akron, Orrville, Chicago, and all points in the West and Northwest.	8 00 a m	5 40 p m
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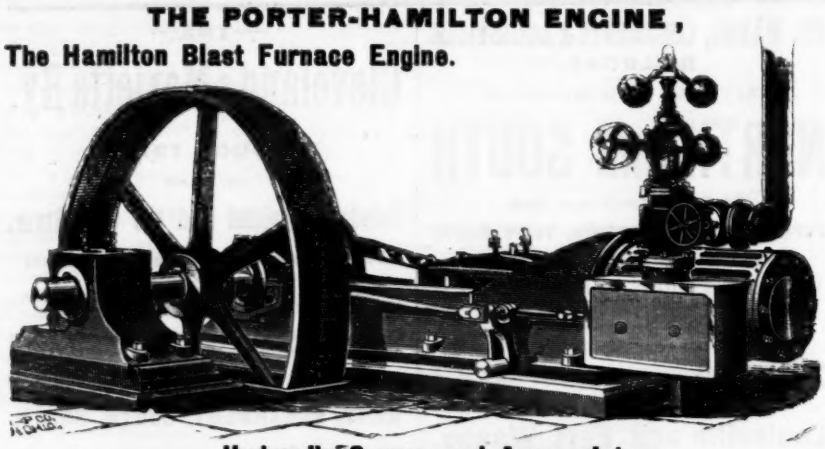

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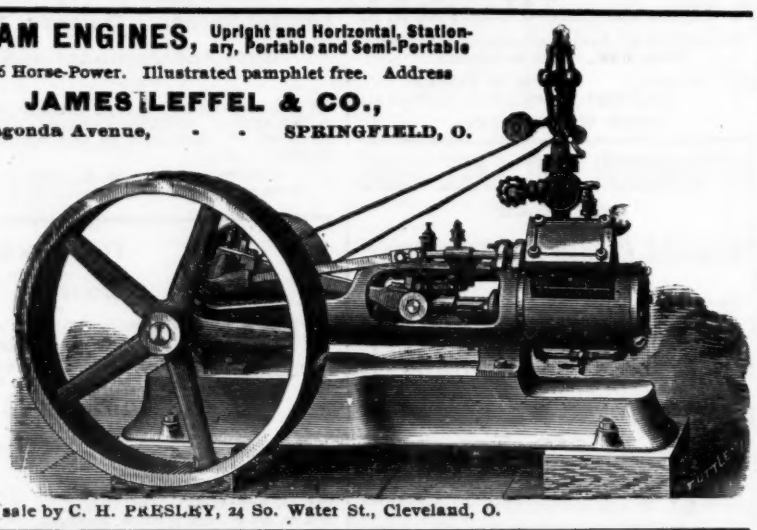

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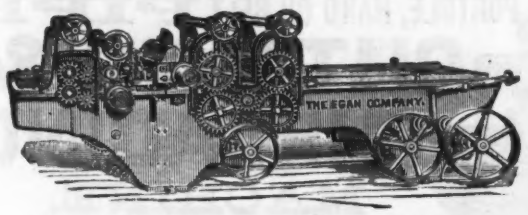

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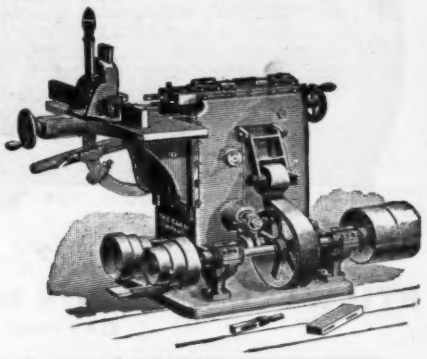

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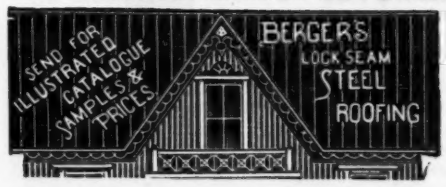

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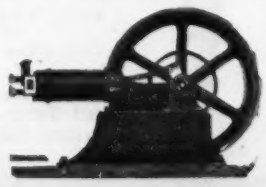

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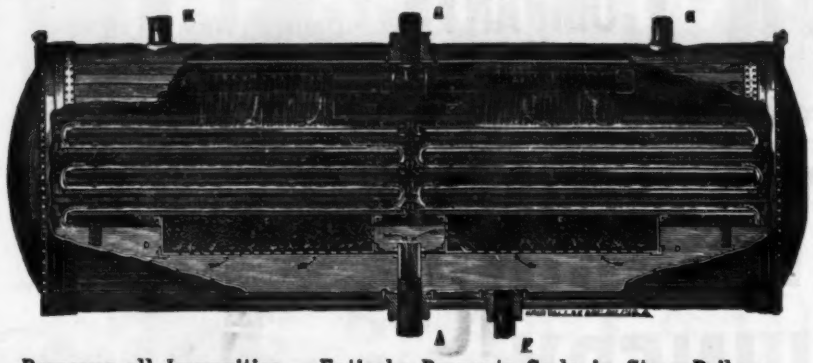

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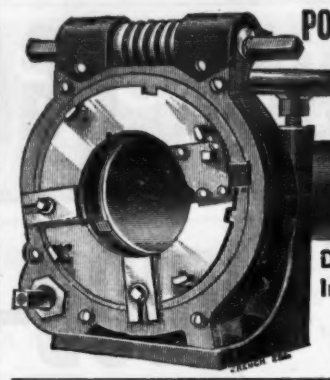

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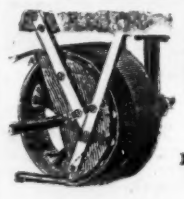

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